Final

Beale Air Force Base Site 8 SVE and Biovent System Remedial Action Summary Report

Project No.: BAEY 2004-7008
Contract No.: FA8903-04-D-8670
Task Order: 0078

CDRLs A001F, A003, B010

Prepared for

U.S Air Force
Center for Environmental Excellence

October 2005

CH2MHILL

CH2MHILL
Constructors, Inc.

October 4, 2005

317652.03.03.02

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Subject: Beale Air Force Base Environmental Remediation and Construction
Final Site 8 SVE and Biovent System Remedial Action Summary Report
CDRLs A001F, A003, and B010
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Dear Mr. Williston:

Three hard copies of the *Final Site 8 SVE and Biovent System Remedial Action Summary Report* were shipped to Mike O'Brien at Beale Air Force Base on October 4, 2005 and electronic copies will be sent on the morning of October 5, 2005. This submittal satisfies the requirements for CDRLs A001F, A003, and B010.

Copies of this document are being sent to the individuals listed on the attached distribution list on October 5, 2005. If you have any questions concerning this submittal, please contact Tricia Carter at 916/920-0300, extension 418.

Sincerely,

CH2M HILL

John Romie
Project Manager

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Environmental Remediation and Construction
Final Site 8 SVE and Biovent System Remedial Action Summary Report
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The Remedial Action Summary Report documents the methods, procedures, and description of the construction activities that took place during the construction of the soil vapor extraction (SVE) system and biovent system at Site SD-08 (Site 8) at Beale Air Force Base (AFB or Base).

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Acronyms and Abbreviations

AFB	Beale Air Force Base
AFCEE	Air Force Center for Environmental Excellence
ARARs	applicable or relevant and appropriate requirements
AST	above ground storage tank
Base	Beale Air Force Base
BGMP	Basewide Groundwater Monitoring Program
bgs	below ground surface
CDRL	contract data requirements list
cy	cubic yard
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration Program
FRAQMD	Feather River Air Quality Management District
GAC	granular activated carbon
IRA	interim remedial action
ISR	in situ respiration
LEL	lower explosive limit
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
msl	mean sea level
NAD83	North American Datum 88
O&M	operations and maintenance
OVM	organic vapor monitor
PAH	polycyclic aromatic hydrocarbon
ppbv	parts per billion by volume
ppmv	parts per million by volume
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
RA	Remedial Action
Site 8	Site SD-08

SVE	soil vapor extraction
TCE	trichloroethylene
TO	Task Order
TPH	total petroleum hydrocarbons
TPH-d	TPH-diesel
TPH-g	TPH-gasoline
VEW	vapor extraction well
VGAC	vapor phase granular activated carbon
VMP	vapor monitoring points
VOC	volatile organic compounds
VW	venting well
WDC	WDC Inc.

SECTION 1.0

Introduction

This Remedial Action (RA) Summary Report (Summary Report) was developed under the Air Force Center for Environmental Excellence (AFCEE), Contract Number FA8903-04-D-8670 under Task Order (TO) No. 0078 (BAEY 2004-7008). The scope for this effort is described in the AFCEE Statement of Work, dated May 10, 2004. This Summary Report fulfills contract data requirements list (CDRL) A001F, A003, and B010.

This Summary Report documents the methods, procedures, and description of the construction activities that took place during the construction of the soil vapor extraction (SVE) system and biovent system at Site SD-08 (Site 8) at Beale Air Force Base (AFB or Base). The Base is located in the Sacramento Valley, approximately 40 miles north of Sacramento and 13 miles east of Marysville, as shown on Figure 1-1. The following sections provide a description of the remedial action that was implemented at Site 8.

1.1 Project Overview

Field activities conducted in 2004 and 2005, which are summarized in this report, support the following components of the Site 8 remedial action under TO 0078:

- Construction of an SVE system to remove volatile organic compound (VOC) contamination impacting the vadose zone and groundwater at Site 8
- Construction of a biovent system to remediate total petroleum hydrocarbon (TPH) contamination impacting the vadose zone and groundwater at Site 8
- Installation of a network of vapor monitoring points (VMP) to evaluate system performance
- Operation and maintenance (O&M) of the SVE and biovent systems for 1 year

This Summary Report has been developed to describe the activities that occurred during the construction phase of this project. An additional O&M Plan was developed (CH2M HILL HILL, 2005a) to describe the planned O&M activities for the SVE and biovent systems.

1.2 Project Goals and Objectives

The goals of the project (implementing SVE and bioventing at Site 8) are as follows:

- Provide immediate protection of human health, welfare, and the environment from potential risks associated with contaminants in vadose-zone soils.
- Remediate vadose-zone soil to prevent further degradation of underlying groundwater.

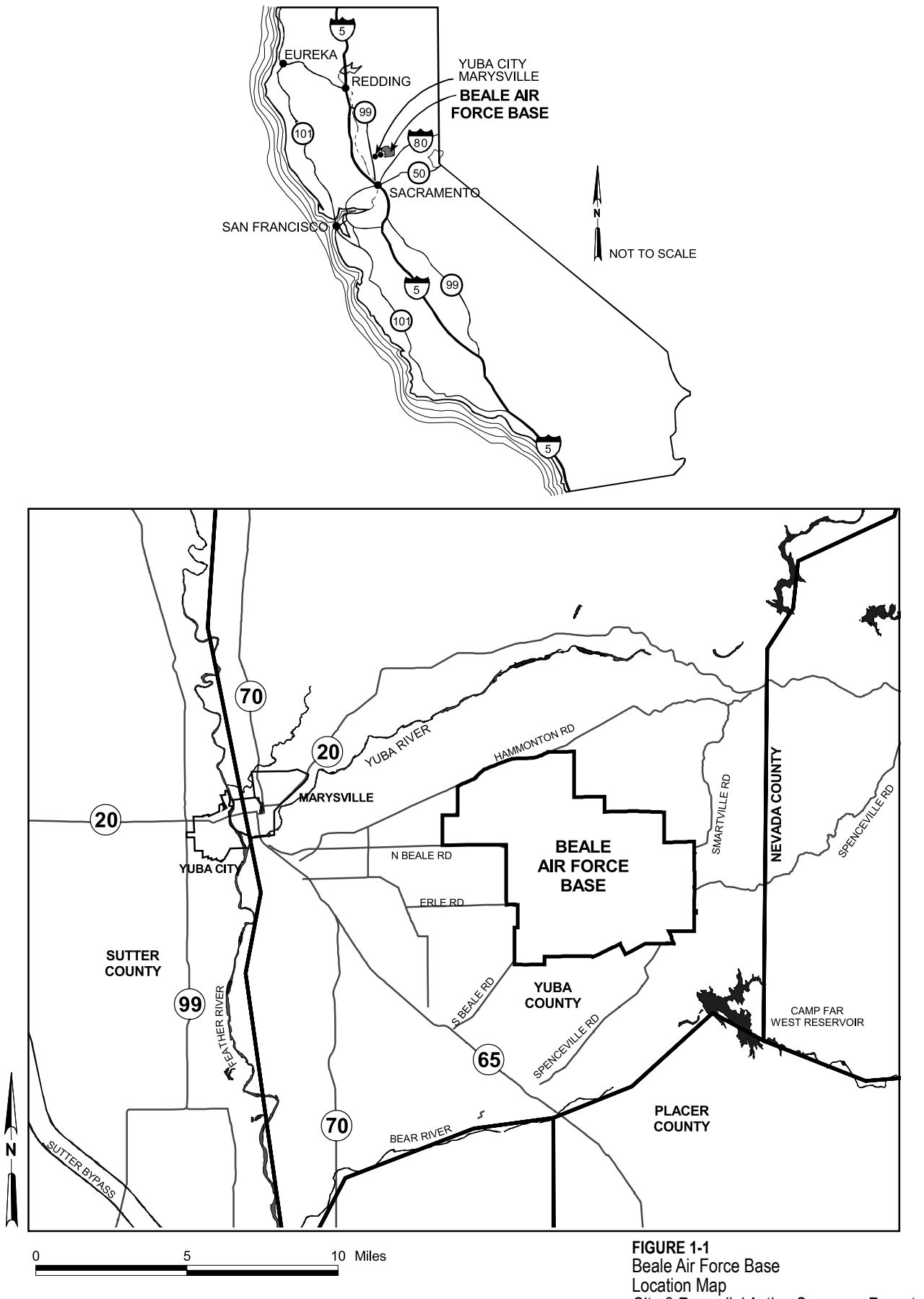

FIGURE 1-1
Beale Air Force Base
Location Map
Site 8 Remedial Action Summary Report
Beale Air Force Base, California

- Perform the removal action in a manner consistent with the planned land use for Site 8, which includes ongoing industrial uses.

The primary objectives of this Summary Report include the following:

- Describe the methods and procedures used during construction.
- Provide a detailed description of the construction activities.
- Describe how the project goals were met and any deviations from those goals.

1.3 Report Organization

This Summary Report is organized as follows:

- Section 1.0: Introduction
- Section 2.0: Background
- Section 3.0: Summary of Construction and Field Activities
- Section 4.0: Project Chronology
- Section 5.0: Conclusion
- Section 6.0: Works Cited

Supporting information is provided in the following appendixes:

- Appendix A: Permits
- Appendix B: Boring Logs
- Appendix C: Well Completion Diagrams for Wells
- Appendix D: Non-Hazardous Waste Manifest
- Appendix E: Drawings
- Appendix F: Analytical Data and Validated Data Summary
- Appendix G: Field Reports
- Appendix H: Photo Documentation
- Appendix I: Agency Comments

SECTION 2.0

Background

2.1 Site-Specific Environmental Setting

Site 8 is located in the northwest portion of Beale AFB near the northern end of the flightline area. Site 8 is the **Former** J-57 Test Cell. There are two Underground Storage Tank (UST) sites within the project area. UST Sites 05-069 and 05-070 are closed.

Open fields and grazing lands surround Site 8. The site includes two concrete pads connected by asphalt paving, a former aboveground storage tank (AST), a septic leachfield, and a surface water drainage ditch. These features are shown on Figure 2-1.

2.1.1 Contaminant Sources and Contamination

Fueling and defueling operations, degreasing activities, spills, leaks, and runoff associated with jet engine testing at Site 8 have been identified as sources of VOCs and fuel-related contamination. Investigations of Site 8 suggest that the primary contaminants of concern are trichloroethylene (TCE), benzene, and TPH, which have impacted vadose-zone soil and groundwater. Soil contamination in the vadose zone has been identified at three source areas: the test pad, the former AST, and the leachfield.

TCE is the primary and most extensive vadose-zone contaminant in the test pad area. TPH has also been detected at elevated concentrations. Spills and surface water runoff from jet engine tests are the most likely source of contamination in the northern portion of Site 8.

TPH is the primary vadose-zone contaminant near the former AST. TPH that has been detected was not identified as gasoline, but as a heavier product with longer carbon chains. Leaks and spills from the former 8,000-gallon AST that held JP-4 jet fuel are the most likely source of the TPH soil contamination. Although no records of spills and leaks have been found, detected TPH concentrations are suggestive of surface spills that have migrated downward.

The most prevalent vadose-zone contaminant in the leachfield area is TPH. Benzene has also been detected above cleanup goals. Surface spills and/or disposal through the leachfield are the likely sources of contamination. TCE has also been measured at concentrations exceeding cleanup goals on the west side of the leachfield area. The source of this contamination is likely either surface water runoff from the asphalt pad or diffusion/dispersion of TCE contamination from the areas north and east of the test pads.

Table 2-1 presents the maximum reported contaminant concentrations for VOCs and TPH (as described above) detected in soil vapor and soil and the corresponding cleanup goals. Numerical, chemical-specific applicable or relevant and appropriate requirements (ARARs) for TPH in soil do not exist, and cleanup goals for fuel compounds in soil at Environmental Restoration Program (ERP) sites have not been developed. Nonetheless, to protect groundwater quality to the extent practicable, Beale AFB will operate the Site 8 biovent system until the following objectives are met:

- Contaminant reduction rates have reached asymptotic levels, following appropriate rebound testing

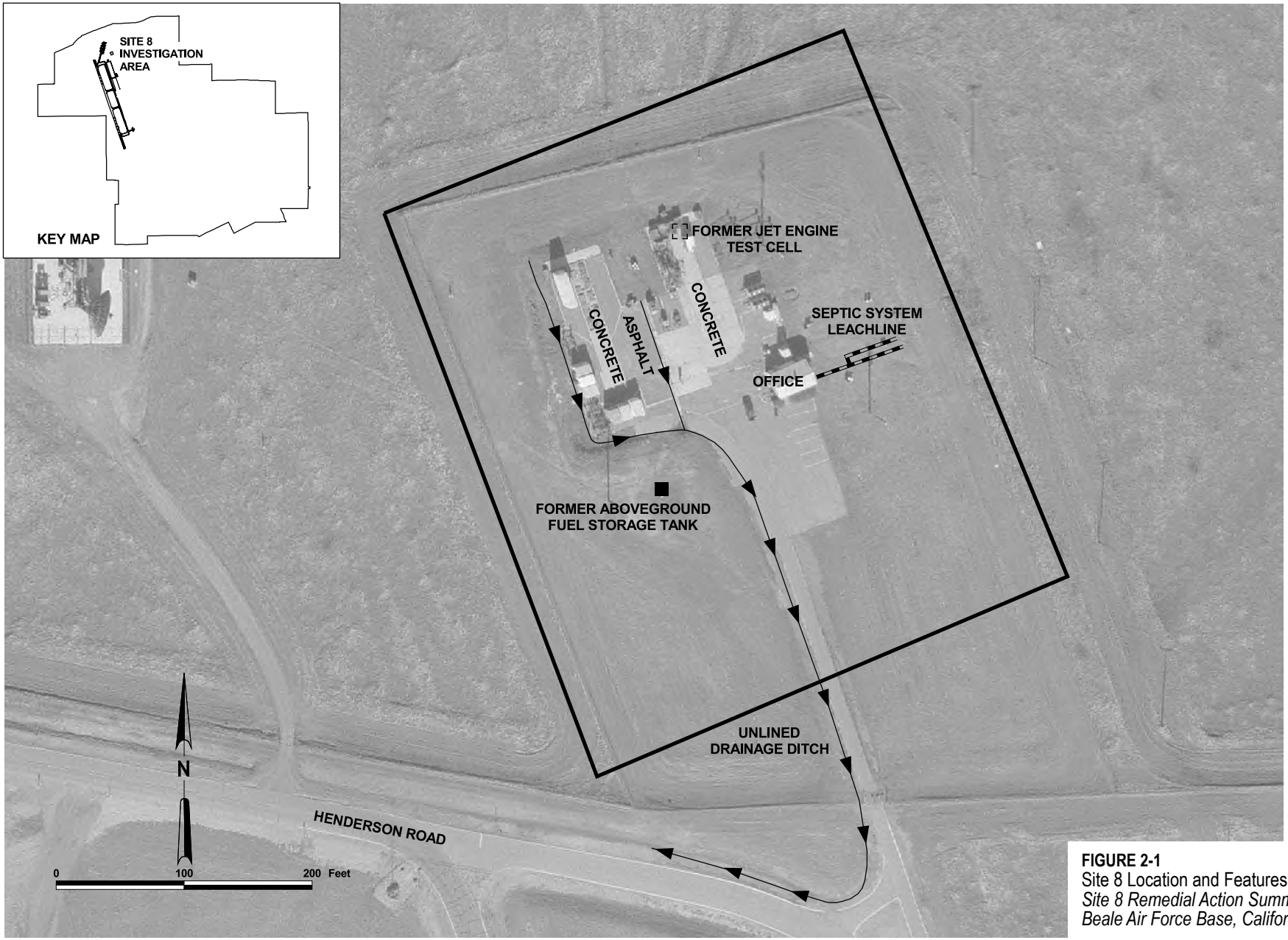

FIGURE 2-1
Site 8 Location and Features Map
Site 8 Remedial Action Summary Report
Beale Air Force Base, California

Oxygen monitoring during periods of shutdown shows that adequate oxygen levels are being maintained in the vadose zone to promote natural biodegradation of TPH as diesel (TPH-d)

TABLE 2-1
Maximum Contaminant Concentrations That Exceed Cleanup Goals at Site 8
Site 8 Remedial Action Summary Report, Beale Air Force Base, California

Medium	Contaminant	Cleanup Goals	Maximum Concentration	Date Maximum Detected	Sample Location
Soil Vapor	TCE	350 ppbv	34,000 ppbv	1999	08C002SB (30 feet bgs)
	Benzene	69 ppbv	43,000 ppbv	1999	08C008SB (60 feet bgs)
	Toluene	11,000/3,000*	120,000 ppbv	1999	08C008SB (60 feet bgs)
	TPH	NA	12,000,000 ppbv	1999	08C008SB (60 feet bgs)
Soil	TPH-d	NA	249.79 mg/kg	2003	08C010MW (85 feet bgs)

*Cleanup values shown are calculated using the State Maximum Contaminant Level (MCL)/Taste And Odor Threshold.

Notes:

Bgs = below ground surface
mg/kg = milligrams per kilogram
NA = not applicable
ppbv = parts per billion by volume

VOC concentrations in soil vapor samples collected from Site 8 in 2003 are less than those shown in Table 2-1. However, VOC concentrations in soil vapor remain significantly greater than the cleanup goals. Groundwater sampling conducted at Site 8 in 2004, as part of the Basewide Groundwater Monitoring Program (BGMP), shows that a portion of the contaminant mass in the vadose zone has reached the groundwater (CH2M HILL, 2004a). Analyses of groundwater samples have confirmed the presence of VOCs and fuel-related hydrocarbons.

Several groundwater monitoring wells and VMPs have been installed during previous investigations and currently exist at Site 8. Six groundwater monitoring wells (08L001MW, 08L002MW, 08E001MW, 08C010MW, 08C011MW, and 08C014MW) are used to monitor contaminant migration from the vadose zone to groundwater. Two VMPs (08C012VMP and 08C013VMP) are in place to monitor soil vapor contamination in the test pad area. One combination groundwater monitoring well/VMP (08C009MW/VMP) is also located in the test pad area.

2.1.2 Ecosystems and Surface Water

A portion of Site 8 is covered by concrete and asphalt and provides little potential habitat for ecological receptors. A wetland area exists north of Soil Vapor Monitoring Points 08C012VMPS and 08C012VMPD. This area was avoided during construction activities. With the exception of intermittent storm runoff, no surface water is present in the Site 8 area. Surface runoff is carried offsite to the southeast in an unlined drainage ditch (see Figure 2-1).

2.1.3 Geology

The Laguna Formation occurs as a thin cap (approximately 25 feet thick) over the underlying Neroly Formation. The Laguna Formation is a fluvial deposit predominantly composed of sands, silts, and clays, with minor amounts of siliceous gravel. The Neroly Formation, which primarily consists of volcaniclastic gravels with tuffaceous sands and minor silts and clays, is the first water-bearing unit at Site 8. Underlying the Neroly Formation is the Ione Formation, which occurs from 135 feet below ground surface (bgs) and is a fluvial and deltaic deposit of mainly clay and sand, sandstone, and metamorphic gravel and conglomerate (Law Environmental, Inc., 1996).

Three distinct lithologic units were observed during the CH2M HILL 1999 site investigation (CH2M HILL, 1999): a layer of predominately silty gravel (0 to 20 feet bgs), a layer of predominantly silty sand (20 to 55 feet bgs), and a layer of predominantly silty gravels and cobbles (deeper than 55 feet bgs). During monitoring well installation at Site 8 in 1999, the hollow-stem auger rig met refusal at depths of 60 to 68 feet bgs (CH2M HILL, 1999).

2.1.4 Groundwater

Geologic logs of boreholes drilled at Site 8 depict a heterogeneous sequence of alluvial sediments. The Neroly Formation sediments appear to be relatively permeable to groundwater flow. The groundwater flow is generally unconfined; however, an underlying clayey zone at 140 feet bgs could inhibit vertical flow. Recharge to monitoring wells screened in the fine-grained unit below 140 feet is slow (Law Environmental, Inc., 1996).

The depth to groundwater at Site 8 was approximately 102 feet bgs (58 feet mean sea level [msl]) in January 2004 (CH2M HILL, 2004b). The groundwater flow direction is toward the south in this area.

2.2 Current and Potential Future Land and Resource Use

The Beale AFB General Plan designates existing and planned future land use for Beale AFB. Much of the land near Site 8 is open space, and the land is used for industrial purposes.

Currently, the land at Site 8 is zoned for industrial use such as aircraft O&M. Because Site 8 is located within the interior of the Base near the flightline, access to the site is restricted to onsite military personnel. Moreover, the interior Base location of Site 8 minimizes the potential for the contaminants present at Site 8 to have any impact on offbase land uses. Because of the proximity of Site 8 to the flightline and access restrictions, open space located within the boundaries of the Site 8 investigation area would not likely be used for recreational purposes. Land use at Site 8 is not anticipated to change in the future.

2.3 Summary of Selected Remedy

SVE and bioventing have been selected as the remedies for the contamination present at Site 8. These remedies focus on the removal of vadose-zone contaminants to minimize or prevent further migration of VOCs and TPH to groundwater. Implementation of both technologies is intended to expedite the removal of VOC and TPH mass from the vadose zone, thereby reducing immediate threats and risk to public health, welfare, and the

environment. SVE has been selected as the removal action for the test pad and leachfield source areas. Bioventing has been selected as the removal action for the former AST source area. Although these remedies are consistent with a potential final remedial action for the Base, SVE and bioventing may not be the sole or selected final remedial actions at the site. SVE and bioventing are anticipated to have little remedial effect on the already impacted groundwater, but are expected to minimize further degradation of groundwater.

In all three source areas, VOC and TPH concentrations in the vadose zone are likely to further degrade underlying groundwater. The primary objective of this removal action is to remediate VOC and TPH contaminants from the vadose zone to minimize or prevent their migration to underlying groundwater or the surrounding areas. Installation of the systems occurred during calendar year 2004, and the systems are projected to operate for 4 years.

2.3.1 Soil Vapor Extraction

The primary objective of the SVE removal action is to remove VOC contaminants (predominantly TCE with some benzene) from the vadose zone to minimize or prevent migration of VOCs to underlying groundwater of the surrounding areas. SVE removes VOC contaminants by applying a vacuum to the vadose-zone soils through a series of vertical extraction wells. The extracted vapors are treated aboveground using granular-activated carbon (GAC) before they are discharged to the atmosphere.

The following criteria were used to design the SVE system:

- Establish an effective vacuum influence in the vadose zone where VOC source areas have been identified.
- Ensure shallow and deep vadose-zone contaminants are remediated by selecting appropriate SVE screening intervals. Because of the difficulties associated with reaming, single-well completions were installed rather than nested SVE wells.
- Space SVE wells so that the vadose-zone soils in the VOC source areas are influenced by the extraction system. The design basis for extraction-well spacing for this project is 200 feet.
- Place SVE well and screen intervals on the basis of lithologic data obtained from boring logs and VOC contaminant distribution data obtained from previous investigations.

The SVE system satisfies the design criteria defined above. The effectiveness of the SVE system has been evaluated by measuring influent VOC concentrations, and induced vacuums and VOC concentrations at VMPs. Monitoring of the SVE system has been incorporated into the existing *Long-term Operation and Maintenance Work Plan* (CH2M HILL, 2004b).

2.3.2 Bioventing

In situ bioventing stimulates the natural biodegradation of petroleum hydrocarbons by supplying oxygen to the existing indigenous microbes. TPH contamination is completely mineralized into harmless byproducts, such as carbon dioxide and water.

The following criteria were used to design the biovent system:

- Establish an effective air injection rate in the vadose zone where the TPH source area has been identified. The air injection rate should maximize oxygen delivery without volatilizing contaminants. It was necessary to coordinate the operation of the biovent system with the SVE system to ensure that the biovent system does not negatively impact the off-gas treatment associated with the SVE system.
- Space biovent wells so that the vadose-zone soils in the TPH-impacted source area receive adequate airflow for contaminant degradation. The design basis for biovent well spacing for this project is 100 feet.
- Place biovent wells and screen intervals on the basis of lithologic data obtained from boring logs and TPH contaminant distribution data obtained from previous investigations. Because of the difficulties associated with reaming, single-well completions were installed rather than nested biovent wells.

The biovent system satisfies the design criteria defined above. The effectiveness of the biovent system was evaluated by measuring pressures, VOC concentrations, and oxygen and carbon dioxide levels at VMPs. Monitoring of the biovent system has been incorporated into the existing *Long-term Operation and Maintenance Work Plan* (CH2M HILL, 2004b).

SECTION 3.0

Summary of Construction Activities

3.1 Regulatory Permitting and Approvals

The following is a brief description of the permits and approvals that were obtained to initiate construction activities:

- Feather River Air Quality Management District (FRAQMD) approval to operate the remedial systems at Site 8: The FRAQMD concurred with the plan to operate an SVE and biovent system at Site 8 on 2 November and 19 November 2004, respectively. The FRAQMD approval letters are provided in Appendix A.
- Yuba County Well Drilling Permits to drill wells: These permits were obtained prior to initiating well drilling activities and are included in Appendix A.
- Base approval of excavation and well drilling activities through the Dig Permit process.
- Preconstruction survey of the site to confirm the absence of vernal pools or other sensitive habitat. The site was cleared for construction activities by base personnel.

3.2 Mobilization and Site Preparation

The following activities were conducted in accordance with the Site Preparation Plan:

- Prepared a subcontractor staging area.
- Placed rolloff bins for drilling waste at the site.
- Conducted a preconstruction site survey of the construction area to document initial site conditions.

The initial site preparation tasks were started in October 2004.

After the construction subcontractors were given notice to proceed, areas for subcontractor staging were identified in the field and on the design drawings. Each subcontractor was responsible for security of its own materials and equipment. Subcontractors indicated needs, if any, for temporary staging and any field office facilities. Several power poles with transformers are located in the vicinity of Site 8. The electrical power connection point and installation was coordinated with the appropriate Base personnel. Upon completion of all contracted work, all temporary construction facilities were removed from the job site, and the subcontractor restored the staging areas to their original condition.

Rolloff bins for waste were placed at Site 8. Waste generated during drilling was placed in the rolloff bins.

3.3 Well Installation

During November and December 2004, 26 wells were constructed at Site 8:

- Nine dual completion VMPs (08C031VMP through and 08C039VMP
- Two dual completion vapor extraction wells (VEW) (08C040VEWD/S and 08C041VEWD/S)
- Two dual completion vent wells (VW) (08C042VWD/S and 08C043VWD/S)

Final locations varied only slightly from the planned locations due to access issues and field conditions encountered at the time of drilling. Well drilling permits were obtained from the Yuba County Environmental Health Department, and dig permits were obtained from Beale AFB Civil Engineering prior to the start of field activities.

Borings were advanced by WDC Inc., (WDC) of Zamora, California, using a hollow-stem auger drilling method, as described below.

Prior to drilling each boring, the drill rig, drilling tools, and downhole coring equipment were decontaminated in accordance with the Sampling Plan (CH2M HILL, 2004c). As specified in the work plan, all downhole equipment (auger, rods, drive casing, samplers, etc.) underwent a thorough decontamination between each boring/sampling event to ensure no cross-contamination occurred. The decontamination process was the following: removal of all visible particulate matter, potable water rinse, followed by high pressure hot-water and liquinox wash, then a final rinse with potable water. Hand manipulated items (for example, soil samplers) were decontaminated in a similar manner followed by rinsing with copious amounts of potable water. Drill cuttings and groundwater were temporarily contained in a hopper provided by the drilling subcontractor, then transferred to rolloff bins provided by MP Environmental.

3.3.1 Hollow-Stem Auger Drilling

All borings were drilled with a CME-85 drill rig equipped with hollow-stem auger, continuous coring, and down-hole hammer. Continuous core was retrieved in 5-foot intervals during drilling of the pilot borings. No core was collected during use of the down-hole hammer.

Borings were drilled by hollow-stem auger drill methods. Lithologic samples were obtained in each boring using a continuous coring method and were logged in accordance with the Sampling Plan (CH2M HILL, 2004c) and the *AFCEE Model Field Sampling Plan* (AFCEE, 1997). Boring logs are presented in Appendix B. Total depths of the borings ranged from 50 to 90 feet bgs.

During drilling, when using the hollow-stem auger rig, gravel and/or cobbles were often encountered, which caused poor recovery during continuous coring. A noticeable "rig chatter" accompanied these borings. These observations are noted on the lithologic logs presented in Appendix B. When the augers hit "refusal" during coring, the downhole hammer was set up and used until the drilling conditions changed and augers could be used again.

3.3.2 Safety

In accordance with the Health and Safety Plan (CH2M HILL, 2004c), air monitoring was conducted during the drilling of all borings. VOCs were monitored in the breathing zone and at the top of the borehole using a MiniRAE 2000 (PID). VOC concentrations detected during drilling ranged from zero to 904 parts per million by volume (ppmv) within the core sample. Elevated concentrations of VOCs were not detected in the breathing zone while drilling.

Borehole moisture or high humidity can often cause PIDs to respond, but are not necessarily indicative of site contamination. VOC readings taken using the PID are shown on the boring logs in Appendix B of this report. No respiratory protection upgrade was necessary for the drilling crew during the field investigations.

Well drilling, construction, and decontamination activities were continuously monitored by CH2M HILL personnel. Health and safety procedures were carefully followed, including the conduct of daily safety meetings.

3.3.3 Well Construction

Well construction details for Site 8 are outlined in Table 3-1. Well construction diagrams are presented in Appendix C. Each well was constructed with 0.020-inch slot, Schedule 40 polyvinyl chloride (PVC) well screen and Schedule 40 PVC blank casing. The wells were constructed as either single or dual completions and screened at various depths.

Number 3 Monterey sand was used as the primary filter pack that extended across the screened interval to approximately 2 to 5 feet above the top of the screen. An approximate 1-foot layer of #30 Monterey sand (transition sand) was placed above the filter pack. A 1- to 5-foot-thick seal consisting of hydrated bentonite chips was then placed above the transition sand. Grout was tremied or poured on top of the bentonite seal to the surface. Each well was completed in an aboveground protective steel stove pipe with a concrete pad, except for the vent wells and VEWs. These wells were completed as flush mounts with the covers removed so that the wells can be attached to the SVE and biovent systems.

TABLE 3-1
Summary of Site 8 2004 Remedial Action Well Construction Information
Site 8 Remedial Action Summary Report, Beale Air Force Base, California

Well	Ground Elevation (feet msl)	Top of Casing Elevation (feet msl)	Total Depth of Boring (feet bgs)	Bottom of Casing (feet bgs)	Screened Interval (feet bgs)	Filter Pack Interval (feet bgs)
08C031VMPS	158.61	158.98	75	45	45-35	46-30
08C032VMPS	157.71	158.32	75	45	45-35	46-30
08C033VMPS	156.60	157.08	75	45	45-35	46-30
08C034VMPS	158.47	159.14	75	45	45-35	46-30
08C035VMPS	157.89	158.14	75	45	45-35	46-30
08C036VMPS	159.29	159.63	75	45	45-35	46-30
08C037VMPS	158.37	158.83	75	45	45-35	46-30

TABLE 3-1
Summary of Site 8 2004 Remedial Action Well Construction Information
Site 8 Remedial Action Summary Report, Beale Air Force Base, California

Well	Ground Elevation (feet msl)	Top of Casing Elevation (feet msl)	Total Depth of Boring (feet bgs)	Bottom of Casing (feet bgs)	Screened Interval (feet bgs)	Filter Pack Interval (feet bgs)
08C038VMPS	159.54	159.89	75	45	45-35	46-30
08C039VMPD	159.28	159.50	75	45	45-35	46-30
08C041VEWS	158.59	159.22	50	50	50-30	50-25
08C040VEWS	157.78	157.92	50	50	50-30	50-26
08C042VWS	158.92	159.42	50	50	50-30	50-26
08C043VWS	160.37	160.78	50	50	50-30	50-26
08C031VMPD	158.61	158.98	75	75	75-65	75-60
08C032VMPD	157.71	158.32	75	75	75-65	75-60
08C033VMPD	156.60	157.08	75	75	75-65	75-60
08C038VMPD	159.54	159.89	75	75	75-65	75-60
08C039VMPD	159.28	159.50	75	75	75-65	75-60
08C035VMPD	157.89	158.14	75	75	75-65	75-61
08C037VMPD	158.37	158.83	75	75	75-65	75-61
08C034VMPD	158.47	159.14	75	75	75-65	75-65
08C036VMPD	159.29	159.63	78.5	75	75-65	78.5-62
08C040VEWD	157.78	158.05	75	78	78-58	78.5-56
08C042VWD	158.92	158.88	80	80	80-60	80-56
08C043VWD	160.37	160.79	85	85	85-65	85-61
08C041VEWD	158.59	159.05	90	90	90-70	90-65

Notes:
bgs = below ground surface
msl = mean sea level

3.3.4 Sampling Methods

Soil Sampling

Core Samples. Fifty-four soil samples were obtained during the field investigation and submitted to CH2M HILL Applied Sciences Laboratory, Corvallis, Oregon. Samples were analyzed for TPH-d (SW8015-E) and TPH-g (SW8015-P). Six of these samples were also submitted for polycyclic aromatic hydrocarbon (PAH) analysis via U.S. Environmental Protection Agency (EPA) Method SW8270SIM. Subsurface samples were collected from the 5-foot core barrels and placed in 4-ounce glass jars. The soil samples were then placed in a cooler with ice. Before collecting each sample, core barrel samplers were decontaminated in accordance with the Sampling Plan (CH2M HILL, 2004c).

EnCore® Samples. Fifty-four EnCore® soil samples were obtained during the field investigation and submitted to CH2M HILL Applied Sciences Laboratory, Corvallis, Oregon, for analysis of VOCs. Subsurface samples were collected using the 5-foot core barrels. The EnCore® sampler was then pushed into the soil until full. Before collecting each sample, core barrel samplers were decontaminated in accordance with the Sampling Plan (CH2M HILL, 2004c).

Soil Vapor Sampling

Forty-four soil vapor samples were collected from borings advanced during the field investigation. Soil vapor samples were each collected in a SUMMA® canister using soil vapor sampling probes provided by WDC. The probes were connected to a steel drive shaft that was used to push the probe to the desired sampling depth. At each boring location, the sample collection apparatus consisted of the following:

- New Teflon® tubing, with one end attached to the soil vapor sampling probe
- A stainless steel tee, with one leg connected to the Teflon® tubing by a vacuum gauge, a stainless steel valve, and a short length of silicone tubing
- A vacuum pump, connected to the middle leg of the tee via silicone tubing and a stainless steel valve
- A pre-cleaned, laboratory-provided SUMMA® canister, connected to the third leg of the tee via a threaded metal fitting. Each SUMMA® canister was equipped with its own valve

When drilling reached the desired depth, the core barrel was retrieved. The soil vapor sampling probe was then assembled and attached to new Teflon® tubing, lowered into the borehole on a downhole hammer or rods, and hammered approximately 1 foot into undisturbed soils.

After driving the probe to the desired depth, the probe was pulled back slightly, exposing the intake screen on the sample probe. The vacuum pump was then switched on, drawing formation gas contained in the interstitial spaces of the soil through the probe and sample tubing. The sample tubing was purged for approximately 30 seconds to 1 minute to remove any residual ambient air from the sampling tubing and to draw in representative formation gas. The exhaust of the soil gas pump was continuously screened with an organic vapor monitor (OVM) to ensure formation gas was sampled and also to provide a rough estimate of the VOC content for the laboratory. After purging the sample tubing, the vacuum pump was switched off and the valve on the SUMMA® canister was slowly opened to allow formation gas to be drawn into the canister. The canisters were supplied by the laboratory with an initial vacuum of approximately 27 to 30 inches of mercury, and samples were drawn until the canister vacuum had decreased to approximately 5 inches of mercury. After collecting a sample, the canister valve was closed and the canister was disconnected from the sampling apparatus. The sample fittings and Teflon® tubing were then purged for several minutes with ambient air prior to collecting the next sample.

The soil vapor samples were submitted to CH2M HILL Applied Sciences Laboratory, Corvallis, Oregon for VOC and TPH analysis by EPA Method TO-14 and SW8015 modified, respectively.

3.3.5 Waste Characterization

Temporary storage of wastes generated during drilling operations to install SVE and bioventing systems included three rolloff bins for a total of approximately 25 cubic yards (cy) of soil from drilling.

Procedures for waste characterization are presented in the *Environmental Restoration Program Long-term Operation and Maintenance Work Plan, Health and Safety Plan, Sampling and Analysis Plan, Field Sampling Plan, and Basewide Quality Assurance Project Plan* (QAPP) (CH2M HILL, 2004d). Two soil waste-characterization samples were collected to facilitate landfill acceptance of the waste. Composite samples were from soil collected from a minimum of four points from each rolloff bin. Compositing consisted of thoroughly mixing the soil with stainless-steel spoons in a stainless-steel bowl. Appropriate sample jars were filled, labeled, and sent to Applied Sciences Laboratory, in Corvallis, Oregon, for analysis.

The first composite sample was analyzed for VOCs, TPH-d, TPH-g, and metals (arsenic, cadmium, lead, and zinc) using EPA Methods SW8260B (VOCs), SW8015-E, SW8015-V, and SW6010. No VOCs or PAHs were detected in the waste characterization samples. TPH-D and TPH-G were detected at 0.09 mg/kg and 6.52 mg/kg, respectively. A second composite sample was analyzed for metals by EPA Method SW6010. Barium, chromium, copper, nickel, vanadium, and zinc were detected at levels below hazardous waste limits. Upon completion of the drilling program, the rolloff bins remained onsite until they were transported by Delta Oil Field Services to Forward Landfill for disposal as a nonhazardous waste. A copy of the manifest is included in Appendix D.

3.4 Survey

Surveys were conducted in February 2005, using the Global Positioning System satellite technology with Real Time Kinematic surveying instruments to provide horizontal and vertical positions for wells installed as part of the recent remedial action at the Site 8 investigation area. The horizontal datum used is the California Coordinate System, North American Datum of 1983 (NAD83/1992 HPGN), Zone 2, and the vertical datum used is the North American Vertical Datum of 1988 (NAVD88). The survey originated from the monuments established at Beale AFB by the National Aeronautics and Space Administration in their geodetic control survey performed in 1999, which was intended to be the basis for all future surveys performed on the Base. All results are reported in United States Survey Feet. The fieldwork was performed by CH2M HILL personnel under the direct supervision of a California Professional Land Surveyor. Coordinates for wells and soil sampling locations are provided in Table 3-2.

TABLE 3-2
Survey Data for the Field Investigation
Site 8 Remedial Action Summary Report, Beale Air Force Base, California

Location ID	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)	Top of Casing Elevation (feet)
08C031VMPS	2183898.84	6722181.46	158.61	158.98
08C031VMPD	2183898.84	6722181.46	158.61	158.95
08C032VMPS	2183795.19	6722198.58	157.71	158.24
08C032VMPD	2183795.19	6722198.58	157.71	158.35
08C033VMPS	2183661.0	6722204.34	156.60	158.43
08C033VMPD	2183661.0	6722204.34	156.60	158.28
08C034VMPS	2183737.37	6722034.76	158.47	158.92
08C034VMPD	2183737.37	6722034.76	158.47	160.36
08C035VMPS	2183664.87	6722083.91	157.89	157.95
08C035VMPD	2183664.87	6722083.91	157.89	157.90
08C036VMPS	2183638.23	6722035.65	159.29	159.68
08C036VMPD	2183638.23	6722035.65	159.29	159.70
08C037VMPS	2183947.00	6722012.11	158.37	158.80
08C037VMPD	2183947.00	6722012.11	158.37	158.82
08C038VMPS	2183698.27	6721950.12	159.54	160.2
08C038VMPD	2183698.27	6721950.12	159.54	161.12
08C039VMPS	2183806.93	6721905.81	159.28	160.40
08C039VMPD	2183806.93	6721905.81	159.28	160.46
08C040VEWS	2183744.19	6722204.48	157.78	158.85
08C040VEWD	2183742.28	6722200.69	157.78	158.98
08C041VEWS	2183854.31	6722007.22	158.59	159.98
08C041VEWD	2183858.44	6722006.52	158.59	159.94
08C042VEWS	2183720.42	6721965.45	158.92	160.27
08C042VEWD	2183724.26	6721996.59	158.92	159.82
08C043VEWS	2183697.04	6722050.20	160.37	161.52
08C043VEWD	2183701.48	6722048.77	160.37	161.66

3.5 SVE System

3.5.1 System Installation

The VOC source areas are centered on the former test pad area and leach field locations. To remediate the VOC source areas, an SVE system was installed on the east side of Site 8. Figure 3-1 shows the locations of SVE wells, VMPs, the conveyance piping layout, and the SVE system (Appendix E contains the as-built drawing). The remediation system consists of the following:

- Four SVE wells (08C040VEWS, 08C040VEWD, 08C041VEWS, and 08C041VEWD [proposed]) for source removal
- Seven VMPs (08C009MW/VMP, 08C012VMP, and 08C013VMP [existing]; and 08C031VMP, 08C032VMP, 08C033VMP, and 08C037VMP [installed]) to monitor remedial effects
- A modular skid-mounted SVE unit consisting of a blower and moisture knockout tank
- Vapor-phase GAC vessels for off-gas treatment
- A 32-ampere, 230-volt, three-phase electrical service
- 2-inch PVC conveyance piping routed aboveground

The SVE system was sized to handle soil vapor flow from the TCE and the benzene source areas. Soil vapor is extracted from 08C040VEWS, 08C040VEWD, 08C041VEWS, and 08C041VEWD using a positive displacement blower powered by a 7.5 horsepower motor. The blower is capable of extracting approximately 420 cubic feet per minute at 50 inches of water. The system is equipped with a 55-gallon moisture knockout tank containing a high-level shutoff switch. Soil vapors are treated using two vapor-phase granular activated carbon (VGAC) vessels, connected in series. During summer 2005, a heat exchanger will be installed to limit the temperature of the vapors entering the carbon vessels. The process equipment requires a 32-ampere, 230-volt, three-phase electrical service. Several power poles with transformers were identified in the vicinity of the proposed equipment compound. The electrical power connection point and installation was coordinated with the appropriate Base personnel.

3.5.2 Baseline Sampling and Analysis

Chemical sampling and analysis was conducted during this construction project. During the O&M period (from end of construction to the end of June 2005), regular compliance sampling of the soil vapor was performed. An O&M Plan was developed to address sampling and analysis during the O&M period (CH2M HILL, 2005a).

Analytical data collected during construction was used to provide a baseline to analyze performance of the SVE and biovent systems. A summary of the data is provided in Appendix F.

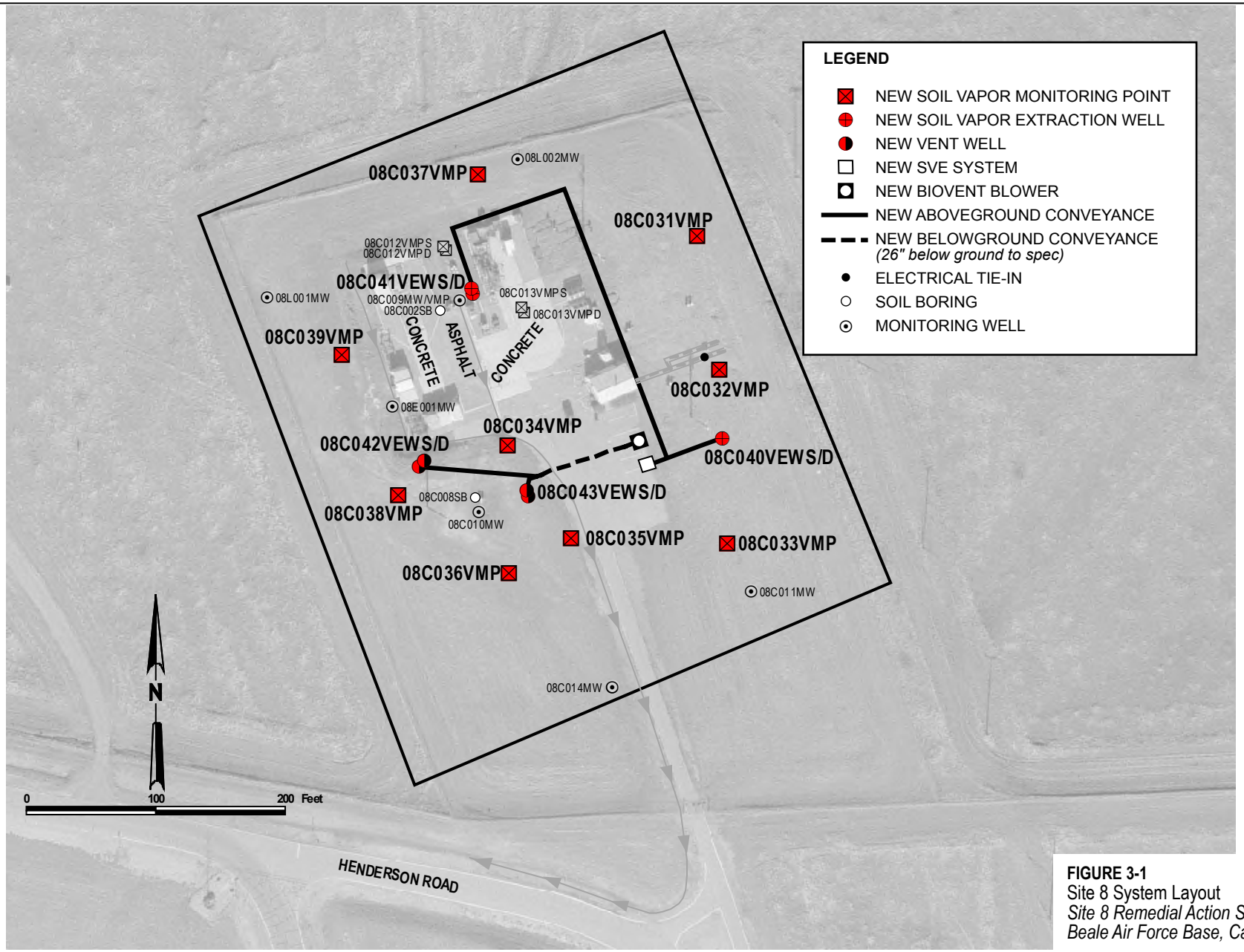

FIGURE 3-1
Site 8 System Layout
Site 8 Remedial Action Summary Report
Beale Air Force Base, California

3.5.3 Startup and Shakedown Testing

The SVE system at Site 8 became fully operational on April 4, 2005. A summary of the startup strategy and related activities are summarized in the following sections. A summary of key events and dates during the startup and shakedown activities is summarized in Section 4.0.

SVE System Startup

Prior to startup of the SVE blower, the vacuum/pressure at each of the VMPs and VEWs was measured on January 6 and 17, 2005. Initial oxygen, carbon dioxide, VOC, and methane data were also collected for each VMP and VEW. The blower was then started on January 24, 2005.

Within an hour of the startup, the following operating parameters were measured:

- Vacuum and temperature at the blower intake
- Pressures and temperatures at the blower discharge, mid-carbon, and post-carbon
- Vacuum upstream of the air filter
- Total system air flow

The vacuum at the blower intake should not approach or exceed the maximum vacuum of 14 inches of mercury specified for the blower. The calculated vacuum loss across the air filter was used to determine when the air filter is dirty and should be cleaned or replaced. The total system air flow, combined with VOC or TPH data, was used to calculate mass removal rates. These measurements will be included as part of quarterly reporting.

After the system operated for 8 hours, the vacuum at the VMPs and VEWs was measured to obtain a rough estimate of the area of influence. These data were collected again after 24 hours.

The SVE system was shut down on January 27, 2005, because of a flow restriction in the lag VGAC vessel. The restriction was caused by inadequate outflow piping inside the lag vessel. The system remained off for the rest of the first quarter 2005. A summary of the data collected during the initial startup of the SVE system is provided in the *Long-term Operation and Maintenance (LTO&M) First Quarter 2005 Report* (CH2M HILL, 2005b) and is summarized in Table 3-3.

A new lag VGAC vessel was installed on April 1, 2005. The SVE system was successfully restarted on April 4, 2005. Vacuums at the VMPs and VEWs were measured at 8 hours and again at 24 hours after the restart.

After a week of operation, another set of oxygen, carbon dioxide, VOC, and methane data was collected at the VMPs. These data were also collected at each vapor extraction well with he individual well turned off. The SVE system then began continuous operation.

Operational data for the SVE system were recorded weekly for 2 months and then biweekly.

The Site 8 biovent system began continuous operation on February 16, 2005 (see Section 3.6.3). After both systems were operating for a month, an in situ respiration (ISR) test was performed to establish baseline biodegradation rates for the biovent system. The ISR test was conducted in accordance with the biovent system ISR testing protocol (CH2M HILL, 2005a).

TABLE 3-3
ERP Site 8 SVE System Baseline and Startup Monitoring Data, First Quarter 2005
Site 8 Remedial Action Summary Report, Beale Air Force Base, California

Location	Screen Interval (feet bgs)	January 6 and January 17, 2005					January 24, 2005 Vacuum (inches of water)	January 25, 2005 Vacuum (inches of water)
		Vacuum (inches of water)	Oxygen (%)	Carbon Dioxide (%)	VOCs (ppmv)	Methane LEL (%)		
08C009MW/VMP[a]	10	1.8	20.8	0.1	0.0	0.0	0.2	0.9
08C009MW/VMP[a]	25	1.6	20.8	0.0	0.0	0.0	0.8	1.3
08C009MW/VMP[a]	40	1.8	20.9	0.0	0.0	0.0	0.6	1.9
08C009MW/VMP[a]	55	1.6	20.9	0.0	0.0	0.0	0.8	2.0
08C009MW/VMP[a]	70	1.8	20.8	0.0	0.0	0.0	0.1	0.4
08C009MW/VMP[a]	85	1.6	20.9	0.0	0.0	0.0	0.1	0.8
08C012VMPS	20 to 40	1.9	20.8	0.0	0.0	0.0	0.0	0.6
08C012VMPD	60 to 80	1.9	20.7	0.0	0.0	0.0	0.0	0.9
08C013VMPS	15 to 35	1.8	20.8	0.0	0.0	0.0	0.3	0.8
08C013VMPD	70 to 90	1.8	20.9	0.0	0.0	0.0	0.3	0.6
08C031VMPS	35 to 45	2.1	20.9	0.0	0.0	0.0	0.1[b]	0.4
08C031VMPD	65 to 75	1.9	20.9	0.0	0.0	0.0	0.3	0.4
08C032VMPS	35 to 45	1.7	20.9	0.0	0.0	0.0	0.3	0.7
08C032VMPD	65 to 75	1.9	20.8	0.0	0.0	0.0	0.1[b]	0.5
08C033VMPS	35 to 45	1.8	20.7	0.0	0.0	0.0	0.0	0.3
08C033VMPD	65 to 75	1.8	20.7	0.0	0.0	0.0	0.6[b]	0.3
08C037VMPS	35 to 45	2.0	20.9	0.0	0.0	0.0	0.0	0.5
08C037VMPD	65 to 75	1.9	20.9	0.0	0.0	0.0	0.2[b]	0.2
08C040VEWS	30 to 50	2.0	20.8	0.0	11.0	0.0	27.5	27.9
08C040VEWD	58 to 78	2.0	20.7	0.0	23.0	0.0	28.2	28.9
08C041VEWS	30 to 50	1.7	20.9	0.0	87.0	0.0	6.7	7.1
08C041VEWD	70 to 90	1.9	20.8	0.0	0.0	0.0	7.5	8.0

Source: CH2M HILL, 2005b.

[a]Baseline data at 08C009MW/VMP was collected on January 17, 2005.

[b]Positive pressure recorded at this location on January 24, 2005.

Annual ISR testing at the Site 8 monitoring points is used to determine whether biodegradation is occurring within the areas affected by the biovent and SVE systems. ISR testing is performed by shutting the systems down and recording percent oxygen, percent carbon dioxide, VOC concentrations (measured with a photoionization detector or flame-ionization detector), and methane concentration (as a percent of the lower explosive limit [LEL]) several times over a period of 7 days. Wells that are believed to be adjacent to contaminated soil are monitored on four occasions during ISR testing, and the remaining wells are monitored on the first and final days of testing only.

The rate of oxygen use (and carbon dioxide generation) is used to estimate the biodegradation rate at each monitoring point. Comparison of the biodegradation rates among successive ISR tests are used to assess system performance over time. Field VOC readings at the monitoring points indicate whether there is evidence of site-related subsurface volatile contaminants in proximity to the monitoring point.

An initial ISR test was conducted at Site 8 during May 2005. Vacuum, pressure, percent oxygen, percent carbon dioxide, VOC concentration, and methane (as a percent of LEL) were recorded at all Site 8 monitoring points on May 9, May 10, May 13, and May 16, 2005. Additional data were recorded at selected monitoring points on May 19, 2005. The data are being evaluated to determine biodegradation rates. ***The complete results of the May 2005 ISR testing will be presented in the LTO&M 2005 Semi-annual Report*** **(CH2M HILL, September 2005c).**

Both the SVE system and biovent system were shut down to perform the ISR test. Following completion of the ISR test, both systems were restarted and the standard monitoring activities were resumed. A discussion of SVE system operations during second quarter 2005 will be provided in the *LTO&M 2005 Semi-annual Report* (CH2M HILL, September 2005c)

3.5.4 Operation and Maintenance

The SVE system will operate continually to optimize the effectiveness of the system and to achieve the closure objectives. During operating periods, the system will be checked at least weekly to verify that it is operating properly (e.g., no indications of power disruptions, blower malfunction, or pipeline breaks). Operational readings will be recorded biweekly. Data collected during the system checks will be recorded on forms for entry into the O&M database. Types of information to be recorded include the following:

- System status
- Well valve settings
- Repairs or supplies needed
- Operating hours
- Temperatures, flow rates, and pressures

The amount of accumulated condensate in the knockout water container is checked twice each week during the rainy season to determine whether draining is needed.

Table 3-4 lists the operational, monitoring, and rebound test data to be collected from the SVE system. The operational data will be used to evaluate system performance and identify required maintenance.

TABLE 3-4
SVE and Biovent Systems Data Collection Frequency
Site 8 Remedial Action Summary Report, Beale Air Force Base, California

Parameter	Biovent	SVE
Operational Data		
Blower outlet pressure	Biweekly	Biweekly
Blower inlet vacuum	Biweekly	Biweekly
Airflow rate	Biweekly	Biweekly
Temperature before and after blower	Biweekly	Biweekly
Differential pressure	Biweekly	Biweekly
Hours operated	Biweekly	Weekly
Drain condensate tank	NA	As needed
Monitoring Data		
VMPs		
Pressure/vacuum	Quarterly	Quarterly
Field measurement of VOC concentration (selected wells)	Quarterly	Quarterly
Field measurement of oxygen and carbon dioxide concentrations (selected wells)	Quarterly	Quarterly
Samples for offsite analysis (selected wells)	NA	Annually
Air Extraction Wells and VWs		
Airflow rate	Biweekly	Quarterly
Pressure/vacuum	Quarterly	Quarterly
Field measurement of VOCs (selected wells)	Quarterly	Quarterly
Field measurement of oxygen and carbon dioxide concentrations (selected wells)	Quarterly	Quarterly
Field measurement of VOC concentration in exhaust vapor	NA	Monthly
Samples of combined extracted vapor, mid-carbon vapor, and exhaust vapor for offsite analysis	NA	Quarterly
Samples for offsite analysis (selected wells)	NA	Semiannually
In Situ Respiration (ISR) Testing		
VMPs and VEWs		
Oxygen measurement (initially and periodically during test)	Annually	Annually
Carbon dioxide measurement (initially and periodically during test)	Annually	Annually
Field measurement of VOC concentration (initially and periodically during test)	Annually	Annually
Rebound Testing		
VMPs and VEWs		
Field measurement of oxygen and carbon dioxide concentrations	As Needed	As Needed
Field measurement of VOC concentration	As Needed	As Needed
Samples for offsite analysis (selected wells)	As Needed	As Needed

Note:
NA = not applicable

Maintenance activities recommended by the blower manufacturer (for example, change oil and lubricate blower, tighten or replace belts, clean or change the inlet air filter) will be performed regularly. Other maintenance and repairs will be performed as needed.

3.6 Biovent System

3.6.1 System Installation

The TPH source area is centered on the former AST location. To remediate the total TPH source area, a biovent system was installed on the east side of Site 8. Figure 3-1 shows the locations of biovent wells, VMPs, the conveyance piping layout, and the biovent system (Appendix E contains the schematics and drawing). The remediation system consists of the following:

- Four biovent wells (08C042VWS, 08C042VWD, 08C043VWS, and 08C043VWD) for source removal
- Five VMPs (08C034VMP, 08C035VMP, 08C036VMP, 08C038VMP, and 08C039VMP) to monitor remedial effects
- A 1.0-horsepower regenerative blower
- A 32-ampere, 230-volt, single-phase electrical service
- 2-inch PVC conveyance piping routed above- and belowground

The in situ biovent system is driven by a 1.0-horsepower, regenerative blower that pumps air into the biovent wells. The blower is equipped with pressure and flow gauges, and is connected to biovent wells 08C042VWS, 08C042VWD, 08C043VWS, and 08C043VWD using PVC piping. Airflow to the individual biovent wells is controlled by means of valves at each wellhead. In addition, sample ports are located at each wellhead for pressure measurements and soil vapor sampling. The process equipment requires a 32-ampere, 230-volt, single-phase electrical service. The electrical power connection point and installation was coordinated with the appropriate Base personnel.

3.6.2 Baseline Sampling and Analysis

During the O&M period (from end of construction to the end of June 2005), regular compliance sampling of the soil vapor was performed. An O&M Plan was developed to address sampling and analysis during the O&M period (CH2M HILL, 2005a).

Analytical data collected during construction was used to provide a baseline to analyze performance of the biovent system. A summary of the data is provided in Appendix F.

3.6.3 Startup and Shakedown Testing

After the SVE system was shut down on January 27, 2005, the VMPs and biovent wells were monitored until they returned to background vacuum levels. Oxygen, carbon dioxide, VOC, and methane data were collected at the VMPs and biovent wells on February 1, 2005, after background vacuum levels were achieved and conditions stabilized. The blower was then started at an initial discharge pressure of approximately 17 inches of water. The blower is rated for a maximum discharge pressure of 51 inches of water.

Pressures were measured at each VMP and biovent well after the blower was operating for 4 hours. The pressure measurements were used to verify that there is air flow to each well.

The blower discharge pressure and temperature and vacuum upstream of the air filter were also measured.

After a week of operation, oxygen, carbon dioxide, VOC, and methane concentrations were collected along with pressure data on February 8, 2005, at the VMPs and biovent wells. The biovent system was shut down on February 8, 2005 after the monitoring data were collected. While procuring a new lag VGAC vessel for the Site 8 SVE system, the Site 8 biovent system was restarted on February 16, 2005, and operated for the rest of the first quarter 2005. A summary of the data collected during initial startup and operation of the biovent system is provided in the *LTO&M First Quarter 2005 Report* (CH2M HILL, 2005b) and is summarized in Table 3-5.

As noted in Section 3.5.3, baseline ISR testing for the biovent system was performed between May 9 and 19, 2005. The ISR test results and a discussion of biovent system operation during the second quarter 2005 will be provided in the *LTO&M 2005 Semi-annual Report* (CH2M HILL, September 2005c).

3.6.4 Operation and Maintenance

The O&M activities for the biovent system are consistent with those for the SVE system, with the exception of managing condensate (knockout-pot water), and the system does not include VGAC vessels. Table 3-4 lists the operational, monitoring, ISR test, and rebound test data to be collected from the biovent system. The operational data will be collected biweekly, and will be used to evaluate the system performance and identify required maintenance.

Maintenance activities recommended by the blower manufacturer (for example, change oil and lubricate blower, tighten or replace belts, clean or change the inlet air filter) will be performed regularly. Other maintenance and repairs will be performed as needed.

3.6.5 System Closure

A review of site characterization data, remediation system design, and operating data will be conducted. This information will be used to assess whether the biovent system, as installed, has the potential to remediate the site to the cleanup goals.

Ongoing monitoring data will be collected to assess the biodegradation rate for the biovent system. The goal of accelerating closure may be achieved by accelerating biodegradation. Monitoring data, described in Table 3-4, will be collected to assess whether air is flowing through the subsurface between the VMPs and the air injection. Measured vacuums or pressures, site lithology, and soil vapor concentrations will be used to evaluate whether subsurface flow is adequate.

Where data indicate inadequate subsurface airflow and associated poor performance (low degradation rates), conditions will be evaluated to assess the cause and the appropriate course of action. Inadequate subsurface airflow may be caused by subsurface areas of low pneumatic permeability, excessive surface leakage of air, or inadequate wellhead pressure or flow. The solutions associated with these conditions are site-specific, and include controlling surface water infiltration where pore liquid is interfering with airflow, sealing the ground surface to reduce surface leakage of air, and increasing wellhead flow. If these or

other reasonable and cost-effective solutions do not resolve poor system performance, the site will be evaluated to assess whether system shutdown is appropriate.

3.7 SVE and Biovent Systems Reporting

Each month, contractor progress status and management reports are prepared as part of management, planning, and reporting requirements for the Beale AFB program.

Periodic monitoring reports will be prepared to present the field, analytical, and operational data; document O&M activities; and discuss system performance. Monitoring reports will also contain recommendations for changes to operations in the upcoming period. First quarter 2005 startup, operation, and monitoring activities for the Site 8 biovent and SVE systems were documented in the *LTO&M First Quarter 2005 Report* (CH2M HILL, 2005b). Second quarter 2005 activities will be documented in the *LTO&M 2005 Semi-annual Report* (CH2M HILL, September 2005c). Ongoing operation and maintenance of the Site 8 biovent and SVE systems will be discussed in subsequent Beale AFB LTO&M semi-annual reports.

3.8 Deviations

Field activities and installation of the SVE and biovent systems were conducted in accordance with the *Site 8 SVE and Biovent System Installation Work Plan* (CH2M HILL, 2004c). Deviations from the Work Plan are summarized in Table 3-6.

TABLE 3-5
ERP Site 8 Biovent System Baseline and Startup Monitoring Data, First Quarter 2005
Site 8 Remedial Action Summary Report, Beale Air Force Base, California

		January 6, 2005					February 1, 2005					February 1, 2005	February 8, 2005				
Location	Screen Interval (feet bgs)	Vacuum (inches of water)	Oxygen (%)	Carbon Dioxide (%)	VOCs (ppmv)	Methane LEL (%)	Vacuum (inches of water)	Oxygen (%)	Carbon Dioxide (%)	VOCs (ppmv)	Methane LEL (%)	Pressure (inches of water)	Pressure (inches of water)	Oxygen (%)	Carbon Dioxide (%)	VOCs (ppmv)	Methane LEL (%)
08C034VMPS	35 to 45	1.8	20.9	0.0	22.0	0.0	1.4	20.8	0.0	28.0	0.0	0.9	0.5	20.9	0.0	28.0	0.0
08C034VMPD	65 to 75	1.9	20.7	0.0	6.0	0.0	1.4	20.8	0.0	8.0	0.0	0.7	0.3	20.9	0.0	8.0	0.0
08C035VMPS	35 to 45	1.9	20.7	0.0	16.0	0.0	1.7	20.7	0.0	18.0	0.0	0.7	0.3	20.7	0.0	18.0	0.0
08C035VMPD	65 to 75	1.9	20.8	0.0	0.0	0.0	1.7	20.8	0.0	0.0	0.0	0.5	0.1	20.9	0.0	0.0	0.0
08C036VMPS	35 to 45	1.8	20.8	0.0	0.0	0.0	1.7	20.8	0.0	0.0	0.0	0.5	0.2	20.9	0.0	0.0	0.0
08C036VMPD	65 to 75	1.9	20.9	0.0	0.0	0.0	1.7	20.9	0.0	0.0	0.0	0.2	0.2	20.9	0.0	0.0	0.0
08C038VMPS	35 to 45	1.5	20.7	0.0	0.0	0.0	1.6	20.7	0.0	0.0	0.0	0.5	0.3	20.7	0.0	0.0	0.0
08C038VMPD	65 to 75	1.6	20.9	0.0	0.0	0.0	1.7	20.8	0.0	0.0	0.0	0.6	0.3	20.8	0.0	0.0	0.0
08C039VMPS	35 to 45	1.7	20.9	0.0	0.0	0.0	1.3	20.8	0.0	0.0	0.0	0.2	0.4	20.8	0.0	0.0	0.0
08C039VMPD	65 to 75	1.7	20.8	0.0	0.0	0.0	1.1	20.7	0.0	0.0	0.0	0.2	0.1	20.8	0.0	0.0	0.0
08C042VWS	30 to 50	1.7	20.7	0.0	6.4	0.0	1.6	20.8	0.0	7.0	0.0	4.6	4.1	20.9	0.0	0.0	0.0
08C042VWD	60 to 80	1.8	20.8	0.0	0.0	0.0	1.7	20.8	0.0	0.0	0.0	4.6	4.0	20.8	0.0	0.0	0.0
08C043VWS	30 to 50	1.8	17.6	1.2	88.0	0.0	1.7	17.5	1.1	91.0	0.0	4.8	4.2	20.9	0.0	89.0	0.0
08C043VWD	65 to 85	1.8	20.7	0.0	5.1	0.0	1.7	20.8	0.0	6.0	0.0	5.1	4.3	20.8	0.0	5.0	0.0

Source: CH2M HILL, 2005b.

TABLE 3-6
Summary of Deviations from Site 8 SVE and Biovent System Installation Work Plan
Site 8 Remedial Action Summary Report, Beale Air Force Base, California

Planned Action(s)	Description	Reason	Actual Action(s)
Install SVE wells (08C040VEWS and 08C040VEWD) and a VMP (08C032VMP) in their proposed locations.	Proposed locations of SVE wells and VMPs varied slightly to accommodate drill rigs operating in the area.	Power poles and power lines were located in the vicinity of proposed SVE well and VMP locations.	Moved the location of these wells to obtain the proper clearance for drill rigs to operate in the area.
Soil and EnCore® soil samples were to be collected at depths within this hard layer (between 60 and 80 feet bgs) per the Work Plan.	Continuous core samples could not be obtained using hollow-stem auger drilling techniques within a hard cobble layer at approximately 70 feet bgs. Therefore, soil and EnCore® soil samples could not be collected in this hard layer ranging from 16 to 20 feet in thickness.	Presence of hard pan layer between 60 and 80 feet bgs.	Soil and EnCore® soil samples were collected immediately following this hard layer.
Soil vapor samples were to be collected at depths within this hard layer (between 60 and 80 feet bgs) per the Work Plan.	Soil vapor probe samples could not be driven into the cobble layer, regardless of the drilling method used. Therefore, soil vapor samples could not be collected in this hard layer.	Presence of hard pan layer between 60 and 80 feet bgs.	Soil vapor samples were collected immediately following this hard layer.
Screen intervals were to be located at depths within this hard layer (between 60 and 80 feet bgs) per the Work Plan.	Screen intervals varied slightly to locate the intervals within subsurface formations that could provide better air flow to effectively remediate vadose zone contaminants.	Presence of hard pan layer between 60 and 80 feet bgs.	Screen intervals were installed immediately following this hard layer.
Construct a fence to contain process equipment, carbon vessels, and electrical service.	An existing fence around the site eliminated the need to construct a fence around the remediation systems.	An existing gate and fence provides the necessary security for the SVE and biovent system.	A fence was not constructed around the SVE and biovent compound.
Coordinate with vendor to purchase a new skid-mounted SVE system.	Recognized a cost savings by not purchasing a new skid-mounted SVE system.	Utilized existing SVE equipment (carbon vessels and a blower).	Utilized SVE equipment formerly used at Site 31.

SECTION 4.0

Chronology

Table 4-1 presents the chronology of activities performed in 2004 and the beginning of 2005. Further detail regarding construction activities is summarized in the daily field reports provided in Appendix G. In addition, photo documentation of several of the activities is provided in Appendix H.

TABLE 4-1
Chronology of Construction Activities
Site 8 Remedial Action Summary Report, Beale Air Force Base, California

Activity	Date
Draft Work Plan completed	17 September 2004
FRAQMD permit application submitted	September 2004
Drilling permit obtained	27 September 2004
Notice to proceed with field work issued	15 October 2004
FRAQMD permit issued for SVE system	2 November 2004
FRAQMD permit issued for biovent system	19 November 2004
Final Work Plan submitted	1 December 2004
Draft O&M/System Startup Plan submitted	15 December 2004
SVE and biovent systems installed	December 2004
Drilling, sampling, and construction of SVE and bioventing well activities	25 October 2004 through 19 January 2005
Baseline readings collected	06 and 17 January 2005
SVE system start-up and testing	24 January 2005
SVE system offline for modification (carbon vessel limitations)	27 January 2005
System inspection with FRAQMD conducted	31 January 2005
Biovent system startup (1 week)	01 February 2005
Biovent system shakedown and testing (1 week)	08 February 2005
Biovent system re-start for continued operation	16 February 2005
New carbon vessel delivered for SVE system	01 April 2005
New SVE system restart and testing (1 week)	04 April 2005
SVE system begins continuous operation	11 April 2005
Begin ISR testing at biovent and SVE systems	09 May 2005
Complete ISR testing	19 May 2005
Final O&M Plan submitted	11 July 2005

SECTION 5.0

Conclusion

The SVE system was started in early January 2005 and was shut down in late January 2005 because of a flow restriction in the lag VGAC vessel. The SVE system was restarted in April 2005. The Biovent system has been running continuously since February 2005, with the exception of the time during In-Situ Respiration (ISR) tests. ISR testing was completed in May 2005. Long-term operations and maintenance activities of the systems are documented in the Long Term Monitoring and Operations Basewide Groundwater Monitoring Program Semi Annual Data Summary (CH2M HILL, 2004a).

SECTION 6.0

Works Cited

Air Force Center for Environmental Excellence (AFCEE). 1997. *AFCEE Model field Sampling Plan Version 1.1*. March.

CH2M HILL. 2005a. *Final Site 8 SVE and Biovent System Operation and Maintenance Plan*. July.

CH2M HILL. 2005b. *Long-term Operation and Maintenance First Quarter 2005 Report for Remediation Systems at ERP Sites SD-08, SD-10, and LF-13*. July.

CH2M HILL. 2005c. *Long-term Operation and Maintenance 2005 Semi-annual Report*. September.

CH2M HILL. 2004a. *Final Basewide Groundwater Monitoring Program 2004 Semi-annual Data Summary*. June.

CH2M HILL. 2004b. *2004 Long-term Operation and Maintenance Work Plan*. April.

CH2M HILL. 2004c. *Final Site 8 SVE and Biovent System Installation Work Plan*. December.

CH2M HILL. 2004d. *Environmental Restoration Program Long-term Operation and Maintenance Work Plan, Health and Safety Plan, Sampling and Analysis Plan, Field Sampling Plan, and Basewide Quality Assurance Project Plan*.

CH2M HILL. 1999. *Site 8 Field Work Summary Report*. November.

Law Environmental, Inc. 1996. *Installation Restoration Program (IRP), Site Characterization Summary, Informal Technical Report for Site 8, J-57 Test Cell, Beale Air Force Base, California*. May.

APPENDIX A

Permits

#770

BASE CIVIL ENGINEERING WORK CLEARANCE REQUEST
(See Instructions on Reverse)

DATE PREPARED: 8-26-04

1. Clearance is requested to proceed with work at Site 8 - Arnold & Henderson Rd on Work Order No. ________, Contract No. FA8903-04-D-8670 / TO 0078 involving excavation or utility disturbance per (Bldg/line area) attached sketch. This area [X] has [ ] has not been staked or clearly marked.

USA # EXP DATE

2. TYPE OF FACILITY/WORK INVOLVED

A. PAVEMENTS	D. FIRE DETECTION & PROTECTION SYSTEMS			G. AIRCRAFT OR VEHICULAR TRAFFIC FLOW
B. DRAINAGE SYSTEMS	E. UTILITY	OVERHEAD	UNDERGROUND	H. SECURITY
C. RAILROAD TRACKS	F. COMM	OVERHEAD	UNDERGROUND	I. OTHER VUMPS + VEW'S

3. DATE CLEARANCE REQUIRED: 10-1-04

4. DATE OF CLEARANCE:

5. SIGNATURE OF REQUESTING OFFICIAL: Shandon Kissinger

6. TELEPHONE NO.: 788-9131

7. ORGANIZATION: CH2M Hill

ORGANIZATION		REMARKS *(Use Reverse for additional comments)*	REVIEWER'S NAME AND INITIALS
8. BASE CIVIL ENGINEERING	A. ELECTRICAL DISTRIBUTION	SEE SHOTGUN REPOR.	
	B. STEAM DISTRIBUTION		
	C. WATER DISTRIBUTION & GAS	SEE SHOTGUN REPOR	
	D. POL DISTRIBUTION	SEE SHOTGUN REPOR	
	E. SEWER DISTRIBUTION	SEE SHOTGUN REPOR	
	F. ENVIRONMENTAL		
	G. PAVEMENTS/ GROUNDS	SE_ SHOTGUN REPORT	
	H. FIRE PROTECTION	Ok	Pat [signature]
	I. ~~XXXX~~ CATHODIC PROTECTION	SEE SHOTGUN REPORT	
	J. OTHER *(Specify)* ENGINEERING		
9. SECURITY POLICE			
10. SAFETY		OK	[signature]
11. COMMUNICATIONS 634-4527		Cleared 8-30-04	[signature]
12. BASE OPERATIONS			
13. CABLE TV			
14. COMMERCIAL UTILITY COMPANY: TELEPHONE, GAS, ELECTRIC		Dec 7 441224; ~~Nov 9th~~ ~~Oct 26th~~ ~~388108~~	~~USA# 347178~~ EXP SEP 27 1800 642 2444
15. OTHER *(Specify)*			

16. REQUESTED CLEARANCE [X] APPROVED [ ] DISAPPROVED

17. TYPED NAME AND SIGNATURE OF APPROVING OFFICER *(Chief of Operations Flight or Chief of Engineering Flight)*: [signature]

17. DATE SIGNED: 22 Sep 04

Call Shandon

Copy

BASE CIVIL ENGINEERING WORK CLEARANCE REQUEST

(See Instructions on Reverse)

DATE PREPARED: 8-26-04

1. Clearance is requested to proceed with work at Site 8 - Arnold & Henderson Rd. on Work Order No. ______, Contract No. FA8903-04-D-8670 / TO 0078 involving excavation or utility disturbance per attached sketch. (Wetland area) This area [X] has [ ] has not been staked or clearly marked.

USA # EXP DATE

2. TYPE OF FACILITY/WORK INVOLVED

	A. PAVEMENTS		D. FIRE DETECTION & PROTECTION SYSTEMS				G. AIRCRAFT OR VEHICULAR TRAFFIC FLOW
	B. DRAINAGE SYSTEMS		E. UTILITY	OVERHEAD	UNDERGROUND		H. SECURITY
	C. RAILROAD TRACKS		F. COMM	OVERHEAD	UNDERGROUND		I. OTHER KUMPS + VEW'S

3. DATE CLEARANCE REQUIRED: 10-1-04

4. DATE OF CLEARANCE:

5. SIGNATURE OF REQUESTING OFFICIAL: Shandon Kissinger

6. TELEPHONE NO.: 788-9131

7. ORGANIZATION: CH2M Hill

ORGANIZATION	REMARKS *(Use Reverse for additional comments)*	REVIEWER'S NAME AND INITIALS
8. BASE CIVIL ENGINEERING — A. ELECTRICAL DISTRIBUTION		
B. STEAM DISTRIBUTION		
C. WATER DISTRIBUTION & GAS		
D. POL DISTRIBUTION		
E. SEWER DISTRIBUTION		
F. ENVIRONMENTAL	See attached Biological comments (#18 remarks)	[signature]
G. PAVEMENTS/ GROUNDS		
H. FIRE PROTECTION	OK	Pat [signature]
I. ~~XRNK~~ CATHODIC PROTECTION		
J. OTHER *(Specify)* ENGINEERING		
9. SECURITY POLICE		
10. SAFETY	OK	[signature]
11. COMMUNICATIONS 634-4527	Cleared 8-30-04	[signature]
12. BASE OPERATIONS		
13. CABLE TV		
14. COMMERCIAL UTILITY COMPANY [ ] TELEPHONE [ ] GAS [ ] ELECTRIC		

15. OTHER *(Specify)* ______

16. REQUESTED CLEARANCE [ ] APPROVED [ ] DISAPPROVED

17. TYPED NAME AND SIGNATURE OF APPROVING OFFICER *(Chief of Operations Flight or Chief of Engineering Flight)*

17. DATE SIGNED

INSTRUCTIONS

The BCE work clearance request is used for any work (contract or in-house) that may disrupt aircraft or vehicular traffic flow, base utility services, protection provided by fire and intrusion alarm system, or routine activities of the installation. This form is used to coordinate the required work with key base activities and keep customer inconvenience to a minimum. It is also used to identify potentially hazardous work conditions in an attempt to prevent accidents. The work clearance request is processed just prior to the start of work. If delays are encountered and the conditions at the job site change (or may have changed) this work clearance request must be reprocessed.

18. REMARKS. *(This section must describe specific precautionary measure to be taken before and during work accomplishment. Specific comments concerning the approved method of excavation, hand or powered equipment, should be included.)*

Biological Comments:

1. Avoid wetland area (highlighted in in green), north of Soil Vapor Monitoring Points 08C012VMPS and 08C012VMPD. Stay away from this area and keep soil out of this area. Stay on the concrete if possible.

INSTRUCTIONS

The BCE work clearance request is used for any work (contract or in-house) that may disrupt aircraft or vehicular traffic flow, base utility services, protection provided by fire and intrusion alarm system, or routine activities of the installation. This form is used to coordinate the required work with key base activities and keep customer inconvenience to a minimum. It is also used to identify potentially hazardous work conditions in an attempt to prevent accidents. The work clearance request is processed just prior to the start of work. If delays are encountered and the conditions at the job site change (or may have changed) this work clearance request must be reprocessed.

18. REMARKS. *(This section must describe specific precautionary measure to be taken before and during work accomplishment. Specific comments concerning the approved method of excavation, hand or powered equipment, should be included.)*

CEVR has reviewed AF Form 103 (DP#04.173 of 8-26-04) "Site 8 SVE and Biovent Systems", Contract FA8903-03-D-8670/TO 0078. The project is described on the attached forms.

CH2MHill is an Environmental Restoration Program (ERP) contractor and is familiar with the chemical hazards at Site 8. CH2MHill is also familiar with the OSHA HAZWOPER training requirements for personnel working at ERP sites.

There are two Underground Storage Tank (UST) sites within the project area. UST sites 05-069 and 05-070 are closed. Typical chemical hazards at UST sites in soils are fuels and fuel components. Physical hazards at closed tank sites are typically inconsistent compaction of and debris in backfill material.

CH2MHill is familiar with the ERP infrastructure such as monitoring wells or conveyance piping within the project area.

Military Munitions Declaration:
Camp Beale was established in 1942 by the Army as a training facility. The Camp hosted armored and infantry divisions and a chemical warfare school. In 1948 the Air Force took custody of the camp as Beale Bombing and Gunnery Range which was later renamed to Beale AFB. Because of the base's history the potential to encounter hazards such as military munitions related material including Munitions and Explosives of Concern (MEC), unexploded ordnance (UXO), and Chemical Agent Identification Sets (CAIS) is a possibility within the project area. If any military munitions related material is encountered, construction will immediately stop, the area will be isolated and the Beale AFB Explosive Ordnance Disposal (EOD) flight will be notified by calling 911. Any military munitions related material identified shall be removed only by Beale AFB EOD Flight personnel.

If you have any questions please contact Mr. Mike O'Brien or Mr. George Gerges, ERP Element, at 634-3856 or 634-2619 respectively.

Michael E O'Brien, 9-13-04

Site 8 Remediation System Scope of Work

A soil vapor extraction (SVE) system and a biovent system are to be installed at Site 8. Site 8 is located near the northern end of the flightline area, north of Henderson Road. CH2M HILL will be drilling and installing four extraction wells (two shallow and two deep), four air injection wells (two shallow and two deep), and nine vapor monitoring wells at Site 8. The boreholes will each be approximately ten inches in diameter. For the extraction and injection wells, four will be completed to 50 feet bgs and four will be completed to 80 feet bgs. The vapor monitoring wells will each be completed to 75 feet bgs. The total drilling distance will be 1,195 feet. The proposed well locations are provided on the attached figure.

An SVE system will be installed on the eastern side of Site 8. The extraction wells will be connected to the SVE system via aboveground conveyance piping. A biovent system will be installed on the western side of Site 8. The injection wells will be connected to the biovent system via aboveground conveyance piping.

8
9

- add 08C041VMBS.

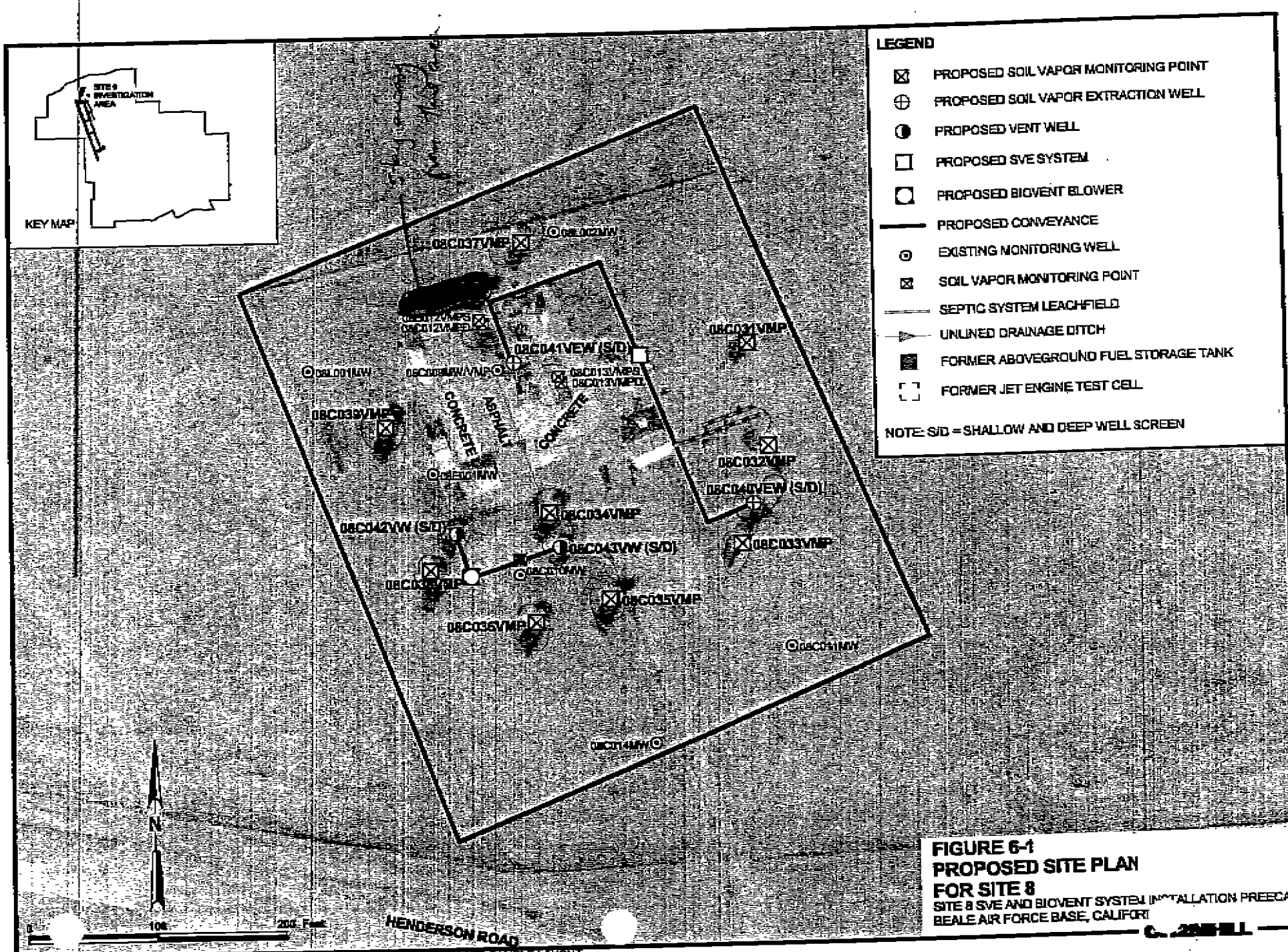

FIGURE 6-1
PROPOSED SITE PLAN
FOR SITE 8
SITE 8 SVE AND BIOVENT SYSTEM INSTALLATION PREECA
BEALE AIR FORCE BASE, CALIFORNIA

\\OD\PROJ\BEALE\O 254\FIGURES\ARCVIEW\SITE8\PREECA.APR SITE 8 PROPOSED SAMPLE LAYOUT

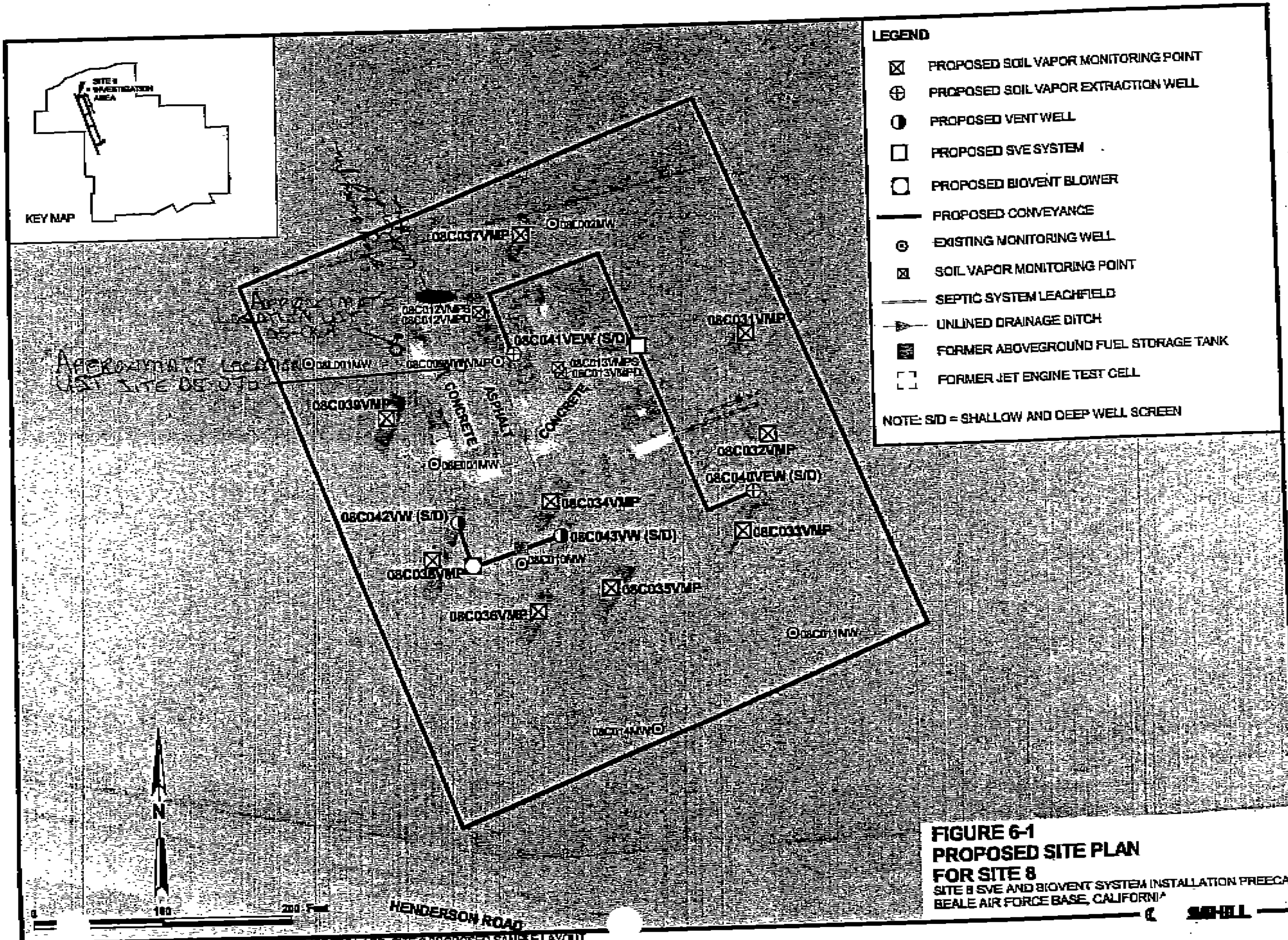

FIGURE 6-1
PROPOSED SITE PLAN
FOR SITE 8
SITE 8 SVE AND BIOVENT SYSTEM INSTALLATION PREECA
BEALE AIR FORCE BASE, CALIFORNIA

DEPARTMENT OF THE AIR FORCE
HEADQUARTES 9TH SUPPORT GROUP (ACC)
BEALE AFB. CALIFORNIA

August 31, 2004

MEMORANDUM FOR: 9 CES/CEOEE

FROM: 9 CES/CEOSC

SUBJECT: Digging Permit Clearance Request

1. The attached map and work statement describe a location to be marked for utility location in accordance with standard digging permit (AF Form 103) procedures.

2. Please review the attachments, and sign off with any comments in the blocks below. Comments will be transferred to the master-digging permit, which will be signed off by Service Contracts Section.

3. If you have any questions, please contact me at 4-2604.

Cesar A. Cuellar, SrA, USAF
9th CES/CEOSC

Section	Comments	Signature
Cathodic Protection	OK	[signature]

REQUESTOR: Shandon Kissinger
LOCATION: Arnold Ave & Henderson Rd (Site 8)
DESCRIPTION: Install soil vapor extraction system

DEPARTMENT OF THE AIR FORCE
HEADQUARTES 9TH SUPPORT GROUP (ACC)
BEALE AFB. CALIFORNIA

August 31, 2004

MEMORANDUM FOR: 9 CES/CEOAE

FROM: 9 CES/CEOSC

SUBJECT: Digging Permit Clearance Request

1. The attached map and work statement describe a location to be marked for utility location in accordance with standard digging permit (AF Form 103) procedures.

2. Please review the attachments, and sign off with any comments in the blocks below. Comments will be transferred to the master-digging permit, which will be signed off by Service Contracts Section.

3. If you have any questions, please contact me at 4-2604.

Cesar A. Cuellar, SrA, USAF
9th CES/CEOSC

Section	Comments	Signature
Electrical	OK	12 9-9-04

REQUESTOR: **Shandon Kissinger**
LOCATION: **Arnold Ave & Henderson Rd (Site 8)**
DESCRIPTION: **Install soil vapor extraction system**

DEPARTMENT OF THE AIR FORCE
HEADQUARTES 9TH SUPPORT GROUP (ACC)
BEALE AFB. CALIFORNIA

August 31, 2004

MEMORANDUM FOR: 9 CES/CEOPG

FROM: 9 CES/CEOSC

SUBJECT: Digging Permit Clearance Request

1. The attached map and work statement describe a location to be marked for utility location in accordance with standard digging permit (AF Form 103) procedures.

2. Please review the attachments, and sign off with any comments in the blocks below. Comments will be transferred to the master-digging permit, which will be signed off by Service Contracts Section.

3. If you have any questions, please contact me at 4-2604.

Cesar A. Cuellar, SrA, USAF
9th CES/CEOSC

Section	Comments	Signature
Grounds Maintenance	AUTO IRRIGATION SYSTEM IN AREA, REPAIR IF DAMAGED MAPS LOCATED IN SITE "D" BLDG 2539	A. Cuellar P.

REQUESTOR: **Shandon Kissinger**
LOCATION: **Arnold Ave & Henderson Rd (Site 8)**
DESCRIPTION: **Install soil vapor extraction system**

DEPARTMENT OF THE AIR FORCE
HEADQUARTES 9TH SUPPORT GROUP (ACC)
BEALE AFB. CALIFORNIA

August 31, 2004

MEMORANDUM FOR: 9 CES/CEOUL

FROM: 9 CES/CEOSC

SUBJECT: Digging Permit Clearance Request

1. The attached map and work statement describe a location to be marked for utility location in accordance with standard digging permit (AF Form 103) procedures.

2. Please review the attachments, and sign off with any comments in the blocks below. Comments will be transferred to the master-digging permit, which will be signed off by Service Contracts Section.

3. If you have any questions, please contact me at 4-2604.

Cesar A. Cuellar, SrA, USAF
9th CES/CEOSC

Section	Comments	Signature
POL Distribution	OK	

REQUESTOR: **Shandon Kissinger**
LOCATION: **Arnold Ave & Henderson Rd (Site 8)**
DESCRIPTION: **Install soil vapor extraction system**

DEPARTMENT OF THE AIR FORCE
HEADQUARTES 9TH SUPPORT GROUP (ACC)
BEALE AFB, CALIFORNIA

August 31, 2004

MEMORANDUM FOR: 9 CES/CEOUW

FROM: 9 CES/CEOSC

SUBJECT: Digging Permit Clearance Request

1. The attached map and work statement describe a location to be marked for utility location in accordance with standard digging permit (AF Form 103) procedures.

2. Please review the attachments, and sign off with any comments in the blocks below. Comments will be transferred to the master-digging permit, which will be signed off by Service Contracts Section.

3. If you have any questions, please contact me at 4-2604.

Cesar A. Cuellar, SrA, USAF
9th CES/CEOSC

Section	Comments	Signature
Water	PASS	
Sewer	PASS	
Gas	PASS	

REQUESTOR: **Shandon Kissinger**
LOCATION: **Arnold Ave & Henderson Rd (Site 8)**
DESCRIPTION: **Install soil vapor extraction system**

YUBA COUNTY ENVIRONMENTAL HEALTH DEPARTMENT

915 8TH STREET, SUITE 123
MARYSVILLE, CA 95901-5273
(530) 749-6450

FEE $ 770 PAID: 10/13/04

0102
RECEIPT NO.

ASSESSOR'S NO.

PERMIT # 6749-6765

APPLICATION FOR PERMIT TO CONSTRUCT, REPAIR, INACTIVATE, OR DESTROY A WELL.

JOB LOCATION N end of Flightline - Hinkler NEAREST CROSS STREET Arnold Ave.

OWNER OF RECORD USAF PHONE (530) 634-2004

MAILING ADDRESS 16001 B St Beale AFB CA 95903

DRILLING CONTRACTOR WDC LICENSE # 283326

MAILING ADDRESS P.O. Box 141, Paynes CA 95678 PHONE 821-2010

CONSULTING FIRM: CH2MHILL PHONE 788-9131

PERMITTED ACTIVITY

- X CONSTRUCT NEW WELL
- ____ DEEPEN WELL
- ____ REPAIR WELL
- ____ INSTALL NEW PUMP
- ____ REPAIR PUMP
- ____ DESTROY WELL
- ____ OTHER (STATE) ____
- ____ TEST HOLE W/DESTRUCTION
- ____ INACTIVATE WELL

INTENDED USE

- ____ DOMESTIC/PRIVATE
- ____ PUBLIC WATER SUPPLY
- ____ IRRIGATION
- ____ INDUSTRIAL
- X MONITOR
- ____ OTHER (STATE) ____

TYPE OF WELL

- ____ CABLE TOOL
- ____ ROTARY
- ____ OTHER (STATE)

CONSTRUCTION SPECIFICATIONS

BOREHOLE DIAM.: ____ DEPTH OF SEAL ____
SEALING MATERIAL: ____ GRAVEL PACK ____ YES ____ NO
CASING: DIAM. ____ DEPTH ____
IF STEEL, GAUGE ____ OR THICKNESS ____
IF PLASTIC, TYPE ____ (MUST MEET ASTM F-480)
IF CONDUCTOR, DIAM. ____ DEPTH ____

WELL LOCATED WITHIN AN EXISTING PUBLIC WATER SYSTEM BOUNDARY: ____ YES ____ NO NAME: ____

WELL DESTRUCTION DIAMETER ____ DEPTH ____ MATERIAL USED ____

1. I will comply with all codes, rules and regulations of the State of California and County of Yuba pertaining to or regulating well construction.
2. I will call for a grout/destruction inspection at least 24 hours prior to pouring.
3. I will submit a water well driller's report to the Environmental Health Department within 15 days of well completion.
4. I will obtain final approval before placing well in service.
5. All materials used shall meet manufacturer's specifications.
6. I will maintain the required minimum setbacks to all existing or proposed sewage disposal areas and to all other sources of contamination.

SIGNATURE OF DRILLING CONTRACTOR ____ DATE 10-11-04

DATE OF WORK START October 18, 2004 COMPLETION January 24, 200

OFFICIAL USE ONLY

WORKMAN'S COMPENSATION DECLARATION ON FILE? X YES ____ NO LICENSE COPY ON FILE ? X YES ____ NO

REMARKS: ____

ISSUED BY: [illegible] DATE 10/13/04 FINAL APPROVAL ____ DATE ____

PERMIT EXPIRES 1 YEAR FROM DATE OF ISSUE

WHITE - OFFICE CANARY - CONTRACTOR PINK - OWNER

FEATHER RIVER AIR QUALITY MANAGEMENT DISTRICT

Serving the Counties of Yuba and Sutter
938 14th Street, Marysville, CA 95901
(530) 634-7659 FAX: (530) 634-7660 Burn Information: (530) 741-6299
Email: fraqmd@fraqmd.org Web Site: http://www.fraqmd.org

David A. Valler, Jr.
Air Pollution Control Officer

November 2, 2004

Tricia Carter
Project Manager
CH2M Hill
2485 Natomas Park Drive
Suite #600
Sacramento, CA 95833

RE: PROJECT # 36053 (SVE-SITE 8) CONDITIONS

Dear Ms. Carter,

The Feather River Air Quality Management District concurs with your plan to operate a soil vapor extraction unit at Site #8. The following conditions for monitoring shall be required for this project:

1. Monthly field instrument readings of the stack exhaust vapors.
2. Quarterly field instrument readings of the vapor monitoring points.
3. Quarterly sample for analytical work of the stack exhaust vapors.
4. Quarterly mass flow rate calculations of pollutants stack exhaust vapors based on condition 3.
5. Benzene emission rate shall not exceed 6.7 lb/year.
6. Trichloroethylene (TCE) emission rate shall not exceed 97 lb/year
7. A minimum of two (2) 2000 lb carbon canisters are required, in series. To protect from breakthrough, one (1) fresh canister shall always be downstream of the one in use.

All recordkeeping shall be maintained for a minimum of two (2) years and made available to the District upon request.

Sincerely,

David A. Valler, Jr.
Air Pollution Control Officer

DAV/mrb

cc: file 36053

FEATHER RIVER AIR QUALITY MANAGEMENT DISTRICT

Serving the Counties of Yuba and Sutter
938 14th Street, Marysville, CA 95901
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Email: fraqmd@fraqmd.org Web Site: http://www.fraqmd.org

David A. Valler, Jr.
Air Pollution Control Officer

November 19, 2004

Tricia Carter
Project Manager
CH2M Hill
2485 Natomas Park Drive
Suite #600
Sacramento, CA 95833

RE: PROJECT # 36053 (SVE-SITE 8) CONDITIONS

Dear Ms. Carter,

The Feather River Air Quality Management District concurs with your plan to operate a biovent unit at Site #8. The following general operating condition for shall apply to this project:

1. Any additions, deletions or alterations of the subject equipment, including a change in the method of operation or a change in the location, shall be reported to the District. Such alterations may require a new Authority to Construct Permit.

2. This facility shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property. (H&S 41700)

The district shall not require any additional recordkeeping or monitoring requirements for the boivent unit.

Sincerely,

David A. Valler, Jr.
Air Pollution Control Officer

DAV/mrb

cc: file 36053

APPENDIX B

Boring Logs

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C031VMP Sheet 1 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NE Section

ELEVATION: 158.61 NORTHING: 2183898.839 EASTING: 6722181.460 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/16/2004 END: 11/16/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-5		HA		SANDY CLAY (CL), dark red and brown (5YR 4/4)	
9	9.5-11	55%	SS		SANDY SILT (ML), red (5YR 5/5), some gravel ~1" diameter	
14	14.5-16	100%	SS		CLAYEY SILT (ML), brown (5YR 4/2), some sand and gravel ½" diameter	PID = 0 ppm
19	19.5-21	33%	SS		SANDY SILT (ML), red (5YR 5/5), gravel fractured ~1½" diameter	PID = 2.0 ppm
24	24.5-26	100%	SS		SAND (SP), brown gray (5Y 4/2)	PID = 3.1 ppm

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C031VMP Sheet 2 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NE Section

ELEVATION: 158.61 NORTHING: 2183898.839 EASTING: 6722181.460 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/16/2004 END: 11/16/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
26						
27						
28						
29	29.5-31	100%	SS		Same as above, occasional gravel ~1" diameter	PID = 10.6 ppm
30						
31						
32						
33						
34	34.5-36	100%			Same as above	PID = 13.5 ppm
35						
36						
37						
38						
39	39.5-41	100%	SS		Same as above	PID = 1.1 ppm, Soil sample SB40 collected
40						
41						
42						
43						
44	44.5-46	33%	SS		Same as above, large gravel/cobbles, fractured 1½" diameter	PID = 0 ppm
45						
46						
47						
48						
49	49.5-51	100%	SS		Same as above, no gravel or cobbles	PID = 1.0 ppm, Soil gas collected
50						

CH2MHILL

PROJECT NUMBER	BORING ID:	
317652.05.02.01	08C031VMP	Sheet 3 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NE Section

ELEVATION: 158.61 NORTHING: 2183898.839 EASTING: 6722181.460 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/16/2004 END: 11/16/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
51	51-55	0%	SS		No sample retreival, into gravel/cobbles	
52						
53						
54						
55	55-59.5				SILTY SAND (ML), brown	PID = 0 ppm, logging from cuttings to 59'
56						
57						
58						
59						
	59.5-61	66%	SS		SILTY SAND (SP), (5Y 4/2), some gravel ½" diameter	PID = 0 ppm
60						
61	61-65				No sample - rock, gravel, cobbles	
62						
63						
64						
65	65-69.5				No sample air rotary, cuttings look like sand	
66						
67						
68						
69						
	69.5-71	66%	SS		SANDY GRAVEL (GP), gravel of all sizes with coarse sand	PID = 0.0 ppm. Collected 08C031SS70
70						
71	71-75				Gravel, cobbles, core collected	
72						
73						
74						
75	75-75				EOB at 75' bgs	Collected 08C031SG75. PID = 4.5 ppm
76						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C032VMP Sheet 1 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 157.71 NORTHING: 2183795.186 EASTING: 6722198.576 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/15/2004 END: 11/15/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-4.5		HA		SILTY CLAY (CL), with a little sand, dark reddish brown (5YR 4/4)	Hand auger to ~4.5'. Refusal.
1						
2						
3						
4						
	4.5-5.5	33%	SS	50-3"	CLAY SILT (ML), with a little sand, dark reddish brown (5YR	Low sample recovery, rock stuck in sampler. PID =
5					4/4)	0.0 ppm
6						
7						
8						
	8.5-10	33%	SS	50/3"	Same as above, some cobbles	Rock stuck in shoe. Looked like quartz. PID = 0.0
9						ppm
10						
11						
12						
13						
14						
15	15-15			50-0"	No recovery, no sample	
16						
17						
18						
	18.5-20	17%	SS		Minimal recovery, same as above, increase in large cobbles	
19						
20						
21						
22	22-25				SANDY CLAY (CL), dark brown (5YR 4/2)	PID = 0.0 ppm
23						
24						
25	25-26	100%	SS		SAND (SP)	PID = 0.0 ppm

PROJECT NUMBER	BORING ID:	
317652.05.02.01	08C032VMP	Sheet 2 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 157.71 NORTHING: 2183795.186 EASTING: 6722198.576 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/15/2004 END: 11/15/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
29	29.5-31	100%	SS		CLAYEY SAND (SP), brown (5YR 3/2), some rocks	PID = 0.0 ppm
34	34.5-36	33%	SS		Same as above	Rock blocked sampler
39	39.5-41	100%	SS		Same as above	SS taken
45	45-50				Large rocks, some sand with a little clay	
50	50-51.5	66%	SS		SANDY SILT (ML), brown (5YR 3/2), a little gravel	SG taken. PID = 13.8 ppm

CH2MHILL

PROJECT NUMBER 317652.05.02.01

BORING ID: 08C032VMP

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 157.71 NORTHING: 2183795.186 EASTING: 6722198.576 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/15/2004 END: 11/15/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
55	55-59.5				No core. Large gravel, smooth	PID = 0.0 ppm
59	59.5-61	66%	SS		SILTY SAND WITH GRAVEL (SW), (5YR 3/2)	PID = 0.0 ppm. 08C032VMPSS60 10:00, 08C032VMPSS60B 10:13, 08C032VMP60-FD 10:15
64	64.5-66	33%	SS		Same as above, cemented	
69	69.5-71	33%	SS		Same as above, cemented, some gravel	
74	74-75	83%	SS		Same as above, more gravel/cobbles	PID = 3.5 ppm. 08C032VMPSG75 11:35

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C033VMP Sheet 1 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 156.60 NORTHING: 2183660.998 EASTING: 6722204.339 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 12/02/2004 END: 12/02/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-3				SILTY CLAY WITH SAND (CL), dark reddish brown (2.5YR 3/4), moist, some gravel to 1" diameter, subrounded, no odor	PID = 0.0
3	3-9.5	100%			SILTY SAND (SC), dark brown (7.5YR 4/3), dry, some gravel to 1.5" diameter, subangular to subrounded, no odor	PID = 0.0
9	9.5-14.5	100%			Same as above, trace gravel	PID = 0.0
14	14.5-19.5	33%			SAND (SP), dark grayish brown (10YR 4/2), dry, fine grained, trace fractured granite, no odor	PID = 0.0
19	19.5-24.5	100%			Same as above, zones of weak cementation	PID = 0.0
24	24.5-29.5	66%			Same as above, zones of weak cementation	PID = 0.0

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C033VMP Sheet 2 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 156.60 NORTHING: 2183660.998 EASTING: 6722204.339 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 12/02/2004 END: 12/02/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
26						
27						
28						
29						
	29.5-34.5	100%			SILTY SAND (SC), dark gray (10YR 4/1), dry, loose, very	PID = 0.0
30					fine grained, no odor	
31						
32						
33						
34						
	34.5-39.5	100%			Same as above, granitic cobbles (fractured) at 36' bgs	PID = 0.0
35						
36						
37						
38						Rig chatter at 38' bgs
39						
	39.5-44.5	100%			SILTY SAND (SC), dark gray (5YR 4/1), dry, with fractured	PID = 0.0
40					cobbles, no odor	
41						
42						
43						
44						
	44.5-49.5	100%			Same as above	PID = 0.0
45						
46						
47						
48						
49						
	49.5-54.5	100%			Same as above	PID = 0.0
50						

CH2MHILL

PROJECT NUMBER 317652.05.02.01

BORING ID: 08C033VMP

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 156.60 NORTHING: 2183660.998 EASTING: 6722204.339 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 12/02/2004 END: 12/02/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
51						
52						
53						
54						
	54.5-59.5	100%			Same as above	PID = 0.0. More rig chatter, slow drilling, hard
55						material
56						
57						
58						
59						
	59.5-64.5	66%			Same as above	PID = 0.0
60						
61						
62						
63						
64						
	64.5-69.5	100%			SILTY SAND WITH GRAVEL (SM), dark brown (10YR 3/3), dry,	PID = 0.0
65					very dense and hard, no odor	
66						
67						
68						
69						
	69.5-70.5	100%			Same as above	PID = 0.0
70						
	70.5-74.5				SAND (SP), very dark gray (10YR 3/1), dry, fine grained,	
71					some fractured/weathered, cobbles, no odor	
72						
73						
74						
	74.5-75	100%			Same as above, damp	PID = 0.0
75					EOB at 75' bgs	
76						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C034VMP Sheet 1 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 158.47 NORTHING: 2183737.369 EASTING: 6722034.761 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/30/2004 END: 12/01/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-4.5				SILTY SAND (SW), brown (7.5YR 4/4), moist, gravel to 2" diameter, subrounded to rounded, loose, sand is fine to medium grained	
4	4.5-9.5	100%			Same as above, damp, no gravel, strong odor	PID = 597
9	9.5-14.5	33%			SILTY SAND (SW), strong brown (7.5YR 5/6), damp, some clay, soft, strong odor	PID = 179
14	14.5-19.5	33%			Same as above	PID = 249
19	19.5-24.5	33%			SAND (SP), very dark gray (7.5YR 3/0), fine grained, loose, trace gravel, strong odor	PID = 357
24	24.5-29.5	66%			SILTY SAND (SW), dark gray (7.5YR 4/0), damp, loose, fine grained, strong odor	Soil gas PID = 2764, PID = 542

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C034VMP Sheet 2 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 158.47 NORTHING: 2183737.369 EASTING: 6722034.761 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/30/2004 END: 12/01/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
26						
27						
28						
29	29.5-34.5	66%			Same as above, very strong odor	PID = 904
30						
31						
32						
33						
34	34.5-39.5	66%			Same as above, trace gravel	PID = 773
35						
36						
37						
38						
39	39.5-44.5	66%			Same as above	PID = 579
40						
41						
42						
43						
44	44.5-49.5	100%			Same as above	PID = 115
45						
46						
47						
48						
49	49.5-52	100%			CLAYEY SAND (SC), strong brown (7.5YR 4/6), dry, fine grained, trace gravel, gray mottling, strong odor	SG sample PID = 3436, PIDOVM = 224
50						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C034VMP Sheet 3 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 158.47 NORTHING: 2183737.369 EASTING: 6722034.761 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/30/2004 END: 12/01/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
51						
52	52-54.5				GRAVELLY SAND (SW), grayish brown (10YR 5/2), dry, fine grained gravel to 2" diameter, angular, strong odor	
53						
54						
	54.5-59.5	17%			SILTY SAND (SW), dark brown (7.5YR 3/2), damp, fine	PID = 0.0
55					grained, loose, slight odor	55' Drillling started to get hard/more difficult
56						
57						
58						
59						
	59.5-64.5	100%			CLAYEY SAND (SC), yellowish brown (10YR 5/4), dry, very	PID = 19.3
60					fine grained, fractured granitic cobbles, slight odor	Sample 08C034SB60 10:20 12/1/04
61						
62						
63						
64						
	64.5-69.5	100%			SILTY CLAYEY FINE SAND (SC), yellowish brown (10YR 5/4),	PID = 1.5
65					dry, fine grained, slight plasticity, with gractured	
66					cobbles, hard, slight odor	
67						
68						
69						
	69.5-75	66%			Same as above, very dense	PID = 0.0
70						
71						
72						
73						
74						
75					Same as above. EOB at 75' bgs	PID during SG sample = 3521

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C034VMP Sheet 4 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 158.47 NORTHING: 2183737.369 EASTING: 6722034.761 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/30/2004 END: 12/01/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
76						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C035VMP Sheet 1 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 157.89 NORTHING: 2183664.866 EASTING: 6722083.906 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 12/03/2004 END: 12/06/2004 LOGGER: E. Haas/B. Moayyad

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-4.5				SILTY CLAY (CL), dark reddish brown (2.5YR 3/4), moist, some sand, no odor	
4.5	4.5-9.5	100%			Same as above, with gravel to 1.5" diameter, dry, no odor	PID = 0.0
9.5	9.5-15	100%			Same as above, with fractured cobbles	PID = 0.0
15	15-20	60%			SILT (ML), dark reddish brown, moist, slightly sticky, non-plastic, soft	PID = 0.0. Rock in shoe
20	20-25	60%			SILT (ML), brown, moist, soft, non-sticky, non-plastic, friable	PID = 0.0. Sample 08C035SB 08:00
25	25-28	80%			Brown silt as above with reddish brown cemented layer at	Sample 08C035SG25 08:10

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C035VMP Sheet 2 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 157.89 NORTHING: 2183664.866 EASTING: 6722083.906 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 12/03/2004 END: 12/06/2004 LOGGER: E. Haas/B. Moayyad

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
25					25.2-25.7'	
26						
27						
28	28-35				POORLY GRADED SAND (SP), brown, dry, loose, very fine, subangular	
29						
30						
31						
32						
33						
34						
35	35-40	53%			WELL GRADED SAND (SW), brown, medium density, dry, ~5% gravel, subangular, lithic sand	
36						Soil sample 08C035SB 09:15
37						
38						
39						
40	40-45	0%			No recovery	Very rocky, no recovery at 40'. No sample, take sample at 36' instead
41						
42						
43						
44						
45	45-50	73%			WELL GRADED SAND (SW) WITH GRAVEL, brown, hard, dry, ~10% gravel	
46						
47						
48						
49						
50	50-60				No core. Well graded gravelly sand as above	Soil vapor sample 08C035SG50 09:30. Hammer clutch on rig breaking down. Some split spoon drive

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C035VMP Sheet 3 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 157.89 NORTHING: 2183664.866 EASTING: 6722083.906 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 12/03/2004 END: 12/06/2004 LOGGER: E. Haas/B. Moayyad

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
51						sample for analytical sample depths
52						
53						
54						
55						
56						
						Hard drilling
57						
58						
59						
60	60-66	80%			WELL GRADED GRAVELLY SAND (SM), light yellowish brown, dry, hard, ~15% coarse gravel, ~10% fines	Soil sample 08C035SB60 10:00. Gravel and cobbles crushed by augers
61						
62						
63						
64						
65						Drilling becomes easier
66	66-70				WELL GRADED SAND (SW), dry, medium density, no gravel	Logged from cuttings to 75'
67						
68						
69						
70	70-75				Becomes hard and gravelly	
71						
72						
73						Hard drilling to about 73'
74						
75	75-76.5				SILT (ML), brown, dry, soft to firm, non-sticky, non-plastic	
76						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C035VMP Sheet 4 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 157.89 NORTHING: 2183664.866 EASTING: 6722083.906 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 12/03/2004 END: 12/06/2004 LOGGER: E. Haas/B. Moayyad

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
77					EOB at 76.5' bgs	

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C036VMP Sheet 1 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 159.29 NORTHING: 2183638.230 EASTING: 6722035.654 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 10/26/2004 10:30:00 AM END: 11/02/2004 12:00:00 PM LOGGER: Carter/Sanchez/S. Shea

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-5	20%			SANDY CLAY (SC), reddish brown, dry, hard, trace gravel	
5	5-10	20%			CLAY WITH INCREASING SAND, gravel 2-2.5"	08C036SB05, 08C036SB05B 11:05
10	10-15	20%			SANDY GRAVEL/GRAVELLY SAND (GP-SP), yellow brown, dry, well rounded gravel 2.5-3" diameter, fine to coarse sand	08C036SB10 11:40
15	15-20	NR				
20	20-25					No recovery - no 20' sample
25	25-30	30%			SILTY SAND (SM) gray (10YR 6/1), dry, poorly graded, with	08C036SG25 14:50, 08C036SB25 15:20. PID = 0.0

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C036VMP Sheet 2 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 159.29 NORTHING: 2183638.230 EASTING: 6722035.654 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 10/26/2004 10:30:00 AM END: 11/02/2004 12:00:00 PM LOGGER: Carter/Sanchez/S. Shea

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
26					trace gravel to 1" in diameter	
27						
28						
29						
30	30-35	40%			FINE SAND (SW), grayish brown (10YR 5/2), dry, no silt, well graded	
31						
32						
33						
34						
35	35-40	40%			Fine to medium SAND (SW), grayish brown (10YR 5/2), dry, well graded	
36						
37						
38						
39						
40	40-45	20%			SAND (SW), gray (10YR 6/1), dry, coarse material, fine to medium grained	08C036SB40 16:15
41						
42						
43						
44						
45	45-50	20%			GRAVEL (GP), gray (10YR 6/1), moist, poorly graded, angular material, fine to coarse sand with gravel	
46						
47						
48						
49						
50	50-55				No 50' sample taken (soil gas)	Core barrel removed to avoid damage

CH2MHILL

PROJECT NUMBER 317652.05.02.01 | BORING ID: 08C036VMP | Sheet 3 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 159.29 NORTHING: 2183638.230 EASTING: 6722035.654 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 10/26/2004 10:30:00 AM END: 11/02/2004 12:00:00 PM LOGGER: Carter/Sanchez/S. Shea

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
55	55-60				Same as above	
60	60-65				No 60' sample taken (soil)	
65	65-70				Same as above	
70	70-75					Drill rig broken. Left site at 11:00
75	75-75.5	30%	SS-1	50 for 1", 10 for 6"	POORLY GRADED SAND WITH SILT (SP-SM), olive brown (2.5Y 4/4), damp, dense, fine sand, rounded cobbles and gravel to 2" diameter	11/1/04 10:00 PID = 4.0 ppm

PROJECT NUMBER	BORING ID:	
317652.05.02.01	08C036VMP	Sheet 4 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 159.29 NORTHING: 2183638.230 EASTING: 6722035.654 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 10/26/2004 10:30:00 AM END: 11/02/2004 12:00:00 PM LOGGER: Carter/Sanchez/S. Shea

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
77						
	77.5-78	100%	SS-2	100 for 6"	SILT lense, dark olive brown (2.5Y 3/3), dry to damp, dense	Hot from augers turning (see field notes)
78	78-78.5	80%	SS-3	150 for 10"	FINE SAND as above, no gravel or cobbles in sample	8C036SB78 from 78-78.5' 11:30
					EOB at 73.5' bgs	PID = no reading, affected by moisture
79						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C037VMP Sheet 1 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NE Section

ELEVATION: 158.37 NORTHING: 2183947.000 EASTING: 6722012.109 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/12/2004 END: LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-4.5				SANDY CLAY (CL), dark to reddish brown (5YR 3/4), moist, some gravel to 1.5" diameter, no odor	
4	4.5-9.5	33%			SILTY CLAY (CL), dark reddish brown (5YR 3/4), moist, with fine grained sand, trace gravel to .75" diameter, rounded, no odor	PID = 0.0
9	9.5-14.5	17%			Same as above	PID = 0.0
14	14.5-19.5				SILTY CLAYEY GRAVEL (GC), moist, gravel to 1.5" diameter, subround, no odor	PID = 0.0
19	19.5-24.5	33%			Same as above, quartz gravel, fractures, cobbles	PID = 0.0
24	24.5-29.5	33%			SAND (SP), dark brown (7.5YR 3/2), damp, fine grained, slight odor	PID = 0.2

CH2MHILL

PROJECT NUMBER 317652.05.02.01 | BORING ID: 08C037VMP | Sheet 2 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NE Section

ELEVATION: 158.37 NORTHING: 2183947.000 EASTING: 6722012.109 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/12/2004 END: LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
29	29.5-34.5	NR			No recovery	
34	34.5-39.5	66%			Same as above	PID = 0.3
39	39.5-44.5	100%			CLAYEY SAND (SM), very dark brown (7.5YR 2.5/2), moist, fine grained, some gravel and fractured cobbles, no odor	PID = 0.0
44	44.5-49.5	17%			SAND (SP), very dark grayish brown (10YR 3/2), moist, fine grained, trace coarse grained, some clay, trace gravel to 1.5" diameter, subrounded, no odor	PID = 0.0
49	49.5-54.5				Same as above	

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C037VMP Sheet 3 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NE Section

ELEVATION: 158.37 NORTHING: 2183947.000 EASTING: 6722012.109 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/12/2004 END: LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
54	54.5-59.5	66%			SILTY SAND (SM), dark brown (10YR 3/3), dry, fine grained, no odor	PID = 0.0
57						57' Rig chatter
59	59.5-64.5				GRAVEL (GW), dry, well graded with cobbles (fractured), volcanic	PID = 0.0
64	64.5-69.5				GRAVEL AND COBBLES (GW), with sand, dark brown (10YR 3/3), dry, fine grained, no odor	No sample, log from cuttings
69	69.5-74.5				Same as above	PID = 4.4 at hole
74	74.5-75				Same as above EOB at 75' bgs	

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C038VMP Sheet 1 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 159.54 NORTHING: 2183698.269 EASTING: 6721950.124 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 5

WATER LEVELS: NA START: 11/29/2004 9:00:00 AM END: 11/30/2004 LOGGER: B. Moayyad/E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-5				WELL GRADED SILTY SAND (SW), brown (7.5YR 5/4), moist, loose, gravelly, sand is subangular, very fine to medium	
5	5-10	12"			WELL GRADED SILTY SAND (SW-SM), reddish yellow (7.5YR 6/6), dry (moist in more silty lenses), brown where moist and silty, medium density (loose where more sandy)	Soil sample 08C038SB05 09:20
10	10-15				SILTY SAND (SM), reddish yellow (7.5YR 6/6), dry to slightly moist, medium density, lenses of brown clayey sand 3" thick	Soil sample 08C038SB10 09:30
15	15-20				SILTY SAND (SM), strong brown (7.5YR 5/6), slightly moist, medium density with precipitate, and nodules present	
20	20-24.5				CLAYEY SAND (SC), brown (7.5YR 5/4), dry, medium-hard density, rocky (chert and decomposed cobble)	Soil sample 08C038SB20 10:10. Rig breaks down at 10:30. Break down and wait for replacement
25	24.5-29.5				Same as above	PID = 0.0

PROJECT NUMBER	BORING ID:	
317652.05.02.01	08C038VMP	Sheet 2 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 159.54 NORTHING: 2183698.269 EASTING: 6721950.124 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 5

WATER LEVELS: NA START: 11/29/2004 9:00:00 AM END: 11/30/2004 LOGGER: B. Moayyad/E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
26						
27						
28						
29	29.5-34.5	33%			SILTY SAND (SM), dark brown (7.5YR 3/2), dry, loose, no odor	PID = 0.0
30						
31						
32						
33						
34	34.5-39.5	66%			Same as above	PID = 0.0
35						
36						
37						
38						
39	39.5-44.5	83%			Same as above	PID = 0.0
40						
41						
42						
43						
44	44.5-49.5	100%			Same as above, moist, with gravel and fractured cobbles, no	PID = 0.0
45					odor	
46						
47						
48						
49	49.5-54.5	66%			Same as above, no gravel	PID = 0.0
50						

CH2MHILL

PROJECT NUMBER 317652.05.02.01

BORING ID: 08C038VMP

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 159.54 NORTHING: 2183698.269 EASTING: 6721950.124 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 5

WATER LEVELS: NA START: 11/29/2004 9:00:00 AM END: 11/30/2004 LOGGER: B. Moayyad/E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
54	54.5-59.5	100%			Same as above, weakly cemented at 56' bgs, dry, with clay, low plasticity	PID = 0.0
59	59.5-64.5	100%			SILTY SAND (SM), dark brown (10YR 3/3), with some clay and angular gravel to 1" diameter, dry, hard, weakly cemented, no odor	PID = 1.8
64	64.5-69.5	83%			Same as above, some coarse grained sand	PID = 0.0
69	69.5-73.5	100%			SILTY SAND (SM), brown (7.5YR 5/2), dry, hard, fine, grained, weakly cemented	PID = 0.0
73	73.5-75				Same as above	
75					EOB at 75' bgs	

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C039VMP Sheet 1 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NW Section

ELEVATION: 159.28 NORTHING: 2183806.930 EASTING: 6721905.808 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 12/02/2004 END: 12/03/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-4.5				SILTY SAND (SC), dark brown (7.5YR 4/4), moist, some clay and gravel, no odor	PID = 0.0
5	4.5-9.5	100%			GRAVELLY SAND (SP), strong brown (7.5YR 4/6), dry, gravel to 1.5" diameter, subangular to subround, volcanic, no odor	PID = 0.0. Driller reports rough drilling due to cobbles and gravel from 3-13' bgs
10	9.5-14.5	60%			SAND (SP), dark yellowish brown (10YR 4/4), dry, little gravel, fine grained, no odor	PID = 0.0
15	14.5-19.5	33%			Same as above	PID = 0.0
20	19.5-24.5	NR			No recovery	
25	24.5-30	100%			SAND (SP), very dark grayish brown (10YR 3/2), dry, fine grained, zones of weak cementation, no odor	PID = 0.0

CH2MHILL

PROJECT NUMBER 317652.05.02.01

BORING ID: 08C039VMP

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NW Section

ELEVATION: 159.28 NORTHING: 2183806.930 EASTING: 6721905.808 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 12/02/2004 END: 12/03/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
30	30-35	100%			Same as above	PID = 0.0
35	35-40	100%			Same as above	PID = 0.0
40	40-45	100%			Same as above, trace gravel	PID = 0.0
45	45-49.5	100%			Same as above, some fractured cobbles	PID = 0.0
49	49.5-54.5	100%			Same as above, without cobbles, loose	PID = 0.7

CH2MHILL

PROJECT NUMBER 317652.05.02.01

BORING ID: 08C039VMP

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NW Section

ELEVATION: 159.28 NORTHING: 2183806.930 EASTING: 6721905.808 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 12/02/2004 END: 12/03/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
51						
52						
53						
54						
	54.5-59.5	100%			Same as above	PID = 0.5
55						
56						Hard drilling and rig chatter at 56'
57						
58						
59						
	59.5-64.5	83%			SILTY SAND (SM), dark grayish brown (10YR 4/2), dry, fine	PID = 0.4
60					grained, gravel to 1" diameter, subround, fractured	
61					cobbles, no odor	
62						
63						
64						
	64.5-69.5	50%			Same as above	PID = 0.0
65						
66						
67						
68						
69						
	69.5-74.5	100%			Same as above	PID = 0.0
70						
71						
72						
73						
74						
	74.5-75	66%			Same as above	PID = 0.0
75					EOB at 75' bgs	
76						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C040VEWS Sheet 1 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 157.78 NORTHING: 2183744.192 EASTING: 6722204.484 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/03/2004 2:36:00 PM END: 11/03/2004 LOGGER: S. Shearer

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-3.5		HA		CLAY (CL), dark reddish brown (5YR 3/4), damp, soft, with sand and occasional gravel, low plasticity	Boring was logged from cuttings - not continuous core or split spoon sampler. Therefore, depths and descriptions are approximate. Hand auger to 3.5' refusal.
1						
2						
3						
	3.5-12				WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM), dark yellowish brown (10YR 3/4), damp, gravel to 1" diameter	
4						
5						
6						
7						
8						
9						
10						PID = 4.0 ppm (moisture affecting PID?)
11						
12	12-18				SILTY CLAY (CL) dark yellowish brown (10YR 3/6), damp, soft, medium plasticity with occasional gravel	
13						
14						
15						
16						
17						
18	18-25				SILTY SAND (SM), olive brown (2.5Y 4/4), damp, loose, fine to medium sand, poorly graded	
19						
20						
21						
22						
23						
24						
25	25-35				SILTY SAND (SM) as above	PID: Borehole (BH) = 0, Breathing Zone (BZ) = 0,

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C040VEWS Sheet 2 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 157.78 NORTHING: 2183744.192 EASTING: 6722204.484 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/03/2004 2:36:00 PM END: 11/03/2004 LOGGER: S. Shearer

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
26						Cuttings = 0
27						
28						
29						
30						
31						
32						
33						
34						
35	35-44				COBBLES, gravel to 1' diameter in cuttings with silty sand, fine sand, increasing silt content	Rig chatter - cobbles 35 - 45'
36						
37						
38						PID BZ = 0
39						
40						
41						
42						
43	43-45					Transitioning out of cobbles
44	44-50				SILTY GRAVEL WITH SAND (GM), dark yellowish brown (10YR 3/4), dry, gravel to 1.5" diameter	
45						
46						
47						
48						
49						
50						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C040VEWS Sheet 3 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 157.78 NORTHING: 2183744.192 EASTING: 6722204.484 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/03/2004 2:36:00 PM END: 11/03/2004 LOGGER: S. Shearer

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
51					EOB at 51' bgs	
52						

CH2MHILL

PROJECT NUMBER 317652.05.02.01

BORING ID: 08C040VEWD

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 157.78 NORTHING: 2183742.284 EASTING: 6722200.692 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/04/2004 9:15:00 AM END: 11/05/2004 12:00:00 PM LOGGER: S. Shearer

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-4.5		HA		CLAY WITH SAND (CL), dark reddish brown (5YR 4/4), damp, soft, low plasticity, and occasional gravel	Hand auger to 2.5' - refusal. Note: Air filter observed to be dirty toward end of day. PID measurements may be based low. PID: Soil = 0
4	4.5-5.5	100%	SS-1		GRAVELLY SILT WITH SAND (ML), dark reddish brown (5YR 4/4), dry to damp, soft	
9	9.5-10		SS-2	60 for 6"	SILTY GRAVEL (SM) WITH CLAY lenses, yellowish brown (10YR 5/6), dry, dense, with occasional dark mottling	PID: Soil = 0.3 ppm, Breathing Zone (BZ) = 0
14	14.5-16	0	SS-3		Same as above (SM)	DN: Still in silty gravel
18	18.5-20		SS-4		SILTY SAND (SM), dark olive brown (2.5Y 7/4), dry, loose, fine to medium sand, poorly graded	PID: Soil = 1.6 ppm. 08C040SG25 10:26
24	24.5-26		SS-5		SILTY SAND (SM) as above	PID: Soil = 0

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C040VEWD Sheet 2 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 157.78 NORTHING: 2183742.284 EASTING: 6722200.692 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/04/2004 9:15:00 AM END: 11/05/2004 12:00:00 PM LOGGER: S. Shearer

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
26						
27						
28						
29	29.5-31		SS-6		Same as above (SM) with cobbles in sampler - cobble color and consistency of brick	PID: Soil = 0
30						
31						
32						
33						
34	34.5-36	66%	SS-7		SILTY SAND (SM) as above	PID: Soil = 0. Sample 08C040SB35 11:15
35						
36						Rig chatter, cobbles at 36.5'
37						
38						
39	39.5-40	4"	SS-8		SILTY GRAVEL (GM), dark yellow brown (10YR 3/4), dry to damp	PID: Soil = 0. Sample 08C040SG70 11:35
40						
41						
42						
43						
44	44.5-45	5"	SS-9		SILTY GRAVEL (GM), color change to strong brown	PID: Soil = 0
45						
46						
47						
48						
49	49.5-50		SS-10		Same as above (GM), strong brown silty gravel	PID: Soil = 0
50						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C040VEWD Sheet 3 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 157.78 NORTHING: 2183742.284 EASTING: 6722200.692 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/04/2004 9:15:00 AM END: 11/05/2004 12:00:00 PM LOGGER: S. Shearer

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
51						
52						
53						DN: 53' hit weakly cemented "hard pan" layer.
54						
	54.5-55	5"	S-11		SILTY SAND (SM), brown (10YR 4/3), fine to medium sand with	
55					some gravel, dark, weakly cemented	55' Auger vibrating. PID: Soil = 0
	55.5-60	5"	S-12	50 for 5"	Same as above (SM)	
56						
57						
58						DN: Increasing density. PID: Breathing Zone (BZ) = 0, Borehole (BH) = 0.
59						
60						Sample 08C040SG60 14:30. PID: Soil gas = 18 ppm
61						
62						62' Augers vibrating
63						
64						
	64.5-65	25%	S-13		Same as above (SM), very dense	No recover, cobbles in sampler
65						
66						DN: Very dense/hard
67						
68						
69						
	69.5-70.5		S-14		SILTY SAND, dry to damp, softer	DN: 50' soft sand. Sample 08C040SB70 15:50
70						
71						
72						
73						
74						DN: 74' Denser material
	74.5-75		SS-15		SILTY GRAVEL (GM), dark yellow brown (10YR 3/4), dry to	PID: Soil = 0
75					damp, gravel to 1" diameter in cuttings	
76						~76' Rig chatter

PROJECT NUMBER	BORING ID:	
317652.05.02.01	08C040VEWD	Sheet 4 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SE Section

ELEVATION: 157.78 NORTHING: 2183742.284 EASTING: 6722200.692 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/04/2004 9:15:00 AM END: 11/05/2004 12:00:00 PM LOGGER: S. Shearer

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
77						
78						
79						
	79.5-80.5		SS-16		SILTY GRAVEL WITH SAND, some cementation	Samples 08C040SB80 16:45, 08C040SG80B 11:50. PID:
80						Soil gas = 0
					EOB at 80.5' bgs	
81						

CH2MHILL

PROJECT NUMBER	BORING ID:	
317652.05.02.01	08C041VEWD	Sheet 1 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NW Section

ELEVATION: 158.59 NORTHING: 2183854.311 EASTING: 6722007.224 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/08/2004 END: 11/10/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-4.5	100%			SANDY CLAY (CL), reddish brown (5YR 4/3), dry, some gravel	PID = 0.0
5	4.5-9.5	100%			CLAY (CL), strong brown (7.5YR 4/6), moist, trace sand and gravel, moderate plasticity, no odor	PID = 0.0
10	9.5-14.5	100%			SANDY CLAY (CL), brown (7.5YR 4/3), dry, low plasticity, no odor	PID = 0.0
15	14.5-19.5	1.0/1.5'			Same as above	PID = 0.0
20	19.5-24.5				No recovery, rock in shoe of sample	
24	24.5-29.5				No recovery	Getting into cobbles

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C041VEWD Sheet 2 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NW Section

ELEVATION: 158.59 NORTHING: 2183854.311 EASTING: 6722007.224 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/08/2004 END: 11/10/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
25						
26						
27						
28						
29	29.5-34.5	100%			SAND (SP), dark brown (7.5YR 3/2), dry, fine grained, trace coarse, no odor	PID = 0.0
30						
31						
32						
33						
34	34.5-39.5	100%			Same as above	PID = 0.0
35						
36						
37						
38						
39	39.5-44.5	100%			Same as above, moist	PID = 0.0
40						
41						
42						
43						
44	44.5-49.5	100%			SILTY SAND (SP), dark brown (7.5YR 3/2), dry, no odor	PID = 0.0
45						
46						
47						
48						
49	49.5-54.5				Same as above, moist	PID = 0.0
50						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C041VEWD Sheet 3 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NW Section

ELEVATION: 158.59 NORTHING: 2183854.311 EASTING: 6722007.224 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/08/2004 END: 11/10/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
54	54.5-59.5	100%			SAND (SP), very dark grayish brown (10YR 3/2), moist, fine grained, no odor	
58						PID = 0.0. Severe rig chatter, likely due to cemented conditions
59	59.5-54.5	2"/1.5'			SILT (ML), light brownish gray (10YR 6/2), dry, no odor	
64	64.5-70				SAND (SP), dark brown (7.5YR 3/2), dry, fine grained, with gravel to 2" diameter, subround to round, no odor	PID = 0.0. Drilling is rough in gravel to 2" diameter and cobbles
70	70-75				Gravel and cobbles, with sand	Logged from cuttings
75	75-80				Same as above	

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C041VEWD Sheet 4 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: NW Section

ELEVATION: 158.59 NORTHING: 2183854.311 EASTING: 6722007.224 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/08/2004 END: 11/10/2004 LOGGER: E. Haas

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
76						
77						
78						
79						
80	80-85				Same as above	
81						
82						
83						
84						
85	85-90				Same as above	
86						
87						
88						
89						
90					SAND (SP), very dark brown (7.5YR 2.5/2), moist, fine grained, zones of weak cementation, no odor. EOB at 90' bgs	
91						

CH2MHILL

PROJECT NUMBER

BORING ID: 08C042VEWS

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 158.92 NORTHING: 2183720.420 EASTING: 6721965.452 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/23/2004 END: 11/23/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-5				Hand auger to 5'. SILTY CLAY (CL), brownish red (5YR 4/4)	This boring was logged from cuttings.
10	10-15				Same as above (CL)	
15	15-20				Same as above (CL)	
20	20-25				SILTY SAND WITH GRAVEL (SM), brown (7.5YR 4/3)	
25	25-30				Same as above (SM)	

CH2MHILL	PROJECT NUMBER	BORING ID: 08C042VEWS Sheet 2 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 158.92 NORTHING: 2183720.420 EASTING: 6721965.452 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/23/2004 END: 11/23/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
26						
27						
28						
29						
30	30-35				Same as above (SM)	
31						
32						
33						
34						
35	35-40				SAND (SP), olive gray (5Y 4/2), some gravel, silt	
36						
37						
38						
39						
40	40-45				SILTY SAND (SM), olive gray (5Y 4/2)	
41						
42						
43						
44						
45	45-50				Same as above (SM), some gravel/cobbles	
46						
47						
48						
49						
50	50-50				Same as above (SM), very little gravel, no cobbles EOB at	

CH2MHILL	PROJECT NUMBER	BORING ID: 08C042VEWS Sheet 3 of 3

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 158.92 NORTHING: 2183720.420 EASTING: 6721965.452 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/23/2004 END: 11/23/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
51					50' bgs	

CH2MHILL	PROJECT NUMBER 317652	BORING ID: 08C042VEWD Sheet 1 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 158.92 NORTHING: 2183724.260 EASTING: 6721996.591 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/22/2004 END: 11/23/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-4		HA		Hand augered to 4' bgs. Refusal	Collected SS5
4	4-9.5				SILTY CLAY (CL), brownish red (5YR 4/4)	
9	9.5-11	100%	SS		Same as above (CL)	Collected SS10CSS10B
14	14.5-16	66%			Same as above (CL), some sand	
19	19.5-21	100%			SILTY SAND WITH GRAVEL (SM)	
24	24.5-26				Same as above (SM)	

CH2MHILL

PROJECT NUMBER 317652 | BORING ID: 08C042VEWD | Sheet 2 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 158.92 NORTHING: 2183724.260 EASTING: 6721996.591 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/22/2004 END: 11/23/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
26						
27						
28						
29	29.5-31	66%	SS		SAND (SP), olive gray (5Y 4/2)	
30						
31						
32						
33						
34	34.5-36	33%	SS		SILTY SAND (SM), olive gray (5Y 4/2)	PID = 0.0
35						
36						
37						
38						
39	39.5-41	66%	SS		Same as above (SM), some cobbles to >1" in diameter	
40						
41						
42						
43						
44	44.5-46	33%	SS		Same as above (SM)	
45						
46						
47						
48						
49	49.5-51	100%	SS		Same as above (SM)	
50						

PROJECT NUMBER	BORING ID:	
317652	08C042VEWD	Sheet 3 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 158.92 NORTHING: 2183724.260 EASTING: 6721996.591 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/22/2004 END: 11/23/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
51						
52						
53						
54						
	54.5-56	100%	SS		Same as above (SM)	
55						
56						
57						
58						
59						
	59.5-61	80%	SS		Same as above (SM)	Collected SS60, 60B and SG60. PID = 41 ppm
60						
61						
62						
63						
64						
	64.5-66	80%	SS		Same as above (SM), more gravel	
65						
66						
67						
68						
69						
	69.5-71	66%	SS		Same as above (SM)	PID = 4.2 ppm
70						
71						
72						
73						
74						
	74.5-76	33%	SS		Same as above (SM)	PID = 0.0 ppm
75						
76						

PROJECT NUMBER	BORING ID:	
317652	08C042VEWD	Sheet 4 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 158.92 NORTHING: 2183724.260 EASTING: 6721996.591 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/22/2004 END: 11/23/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
77						
78						
79						
	79.5-80.5	66%	SS		Same as above (SM)	PID = 92 ppm. During purge of SG Sample at 80.5' bgs
80						
81					EOB at 81' bgs	
82						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C043VW Sheet 1 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 160.37 NORTHING: 2183697.044 EASTING: 6722050.196 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/18/2004 END: 11/19/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
0	0-4		HA		Hand auger to 4', refusal. SANDY CLAY (CL), reddish and brown (5YR 4/4), some cobbles	
4	4-5.5	100%	SS		Same as above	08C043SS05, -MS, -SD 15:15. PID = 0.0
9	9.5-11	12/18	SS		Same as above	08C043SS10 15:20. PID = 0.4
14	14.5-16	6/18	SS		Same as above	PID = 0.0
19	19.5-21	6/18	SS		Same as above	PID = 0.1
24	24.5-26	12/18	SS		SAND (SP), reddish brown (5Y 4/4)	PID = 0.2

PROJECT NUMBER	BORING ID:	
317652.05.02.01	08C043VW	Sheet 2 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 160.37 NORTHING: 2183697.044 EASTING: 6722050.196 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/18/2004 END: 11/19/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
26						
27						
28						
29						
	29.5-31	0/18	SS		No recovery, hit rock. Probably still sand with cobbles.	
30					Based on cuttings SILTY SAND (SM), (2.5Y 4/4)	
31						
32						
33						
34						
	34.5-36	12/18	SS		SAND (SP), reddish brown (5Y 4/4), some silt	
35						
36						
37						
38						
39						
	39.5-41	10/18	SS		Same as above	08C043SB40 -SG40, SG40B. PID = 12.5 during purge
40						
41						
42						
43						Hit cobbles, drilling slowed
44						
	44.5-46	12/18	SS		Same as above	PID = 0.3
45						
46						
47						
48						
49						
	49.5-51	100%	SS		Same as above, silt increasing	PID = 0.3
50						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C043VW Sheet 3 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 160.37 NORTHING: 2183697.044 EASTING: 6722050.196 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/18/2004 END: 11/19/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
51						
52						
53						
54						
	54.5-56	3/18	SS		Same as above, some cobbles up to 3" diameter	PID = 0.0
55						
56						
57						
58						
59						
	59.5-61	6/18	SS		Same as above	08C043SG60 and SS60
60						
61						
62						
63						
64						
	64.5-66	3/18	SS		Same as above	
65						
66						
67						
68						
69						
	69.5-71	6/18	SS		Same as above	PID = 0.0
70						
71						
72						Hit a rock, chatter
73						
74						
	74.5-76	6/18	SS		Same as above	PID = 0.2 ppm
75						
76						

CH2MHILL	PROJECT NUMBER 317652.05.02.01	BORING ID: 08C043VW Sheet 4 of 4

SOIL BORING LOG

PROJECT: Beale Site 8 - SVE/Biovent System Installation LOCATION: SW Section

ELEVATION: 160.37 NORTHING: 2183697.044 EASTING: 6722050.196 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/18/2004 END: 11/19/2004 LOGGER: E. McCarthy

DEPTH BGS (ft)	INTERVAL (ft)	RECOVERY	TYPE-# (SS=Split Spoon ST=ShelbyTube)	STANDARD PENETRATION TEST RESULTS 6-6-6 (in) (N)	CORE DESCRIPTION: SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.
77						
78						
79						
	79.5-81	100%	SS		SAND (SP)	PID = 125, 4500 at top of auger. 08C043SS80
80						
81						
82						
83						
84	84-85	6/12	SS		SILTY SAND (SM) with cobbles	08C043SS85
85						
86						

APPENDIX C

Well Completion Diagrams for Wells

CH2MHILL	PROJECT NUMBER: 317652	BORING ID: 08C031VMP Sheet 1 of 1

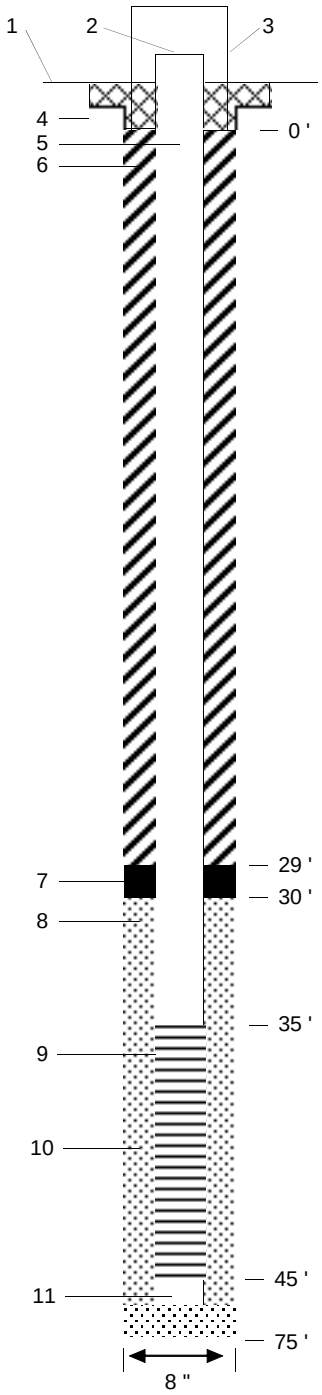
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 158.61 NORTHING: 2183898.839 EASTING: 6722181.46 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: None START: 11/16/2004 END: 11/18/2004 LOGGER: E. McCarthy



1- Ground elevation at well: 158.61 '

2- Top of casing elevation: 158.98 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 1 "
Well casing type: Schedule 80 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout: ~100 gallons

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 9 - 50 lb bags

8- Transition sand: #30 Monterey Sand
a) Quantity used: 1 - 100 lb bag

9-Type/slot size of screen: Schedule 80 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 16 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments: Transition sand: 61-60' and 31-30' bgs.

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652	BORING ID: 08C032VMP Sheet 1 of 1

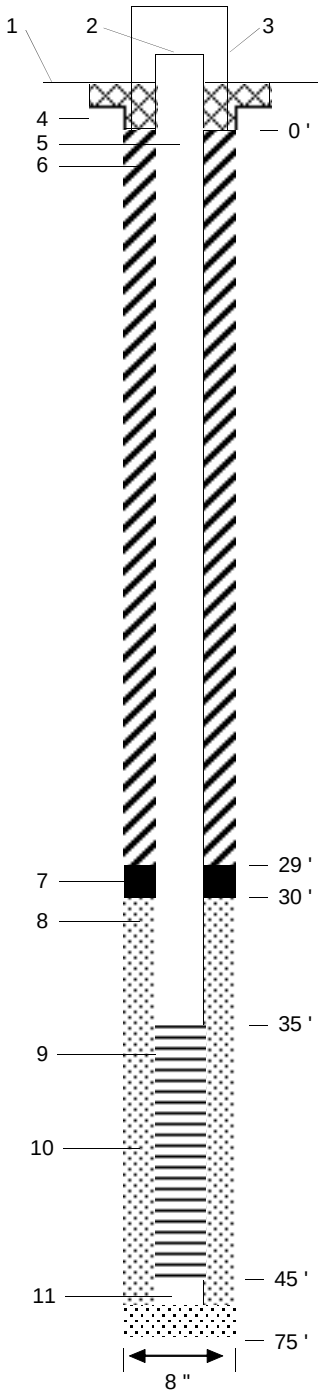
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 157.71 NORTHING: 2183795.186 EASTING: 6722198.576 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: None START: 11/15/2004 END: 11/16/2004 LOGGER: E. McCarthy



1- Ground elevation at well: 157.71 '

2- Top of casing elevation: 158.32 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 1 "
Well casing type: Schedule 80 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement:
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout:

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used

8- Transition sand: #30 Monterey Sand
a) Quantity used:

9-Type/slot size of screen: Schedule 80 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used:

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments: 5% neat cement is 5 lbs bentonite per 100 lbs cement. Transition sand: 61-60' and 31-30' bgs.

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652	BORING ID: 08C033VMP Sheet 1 of 1

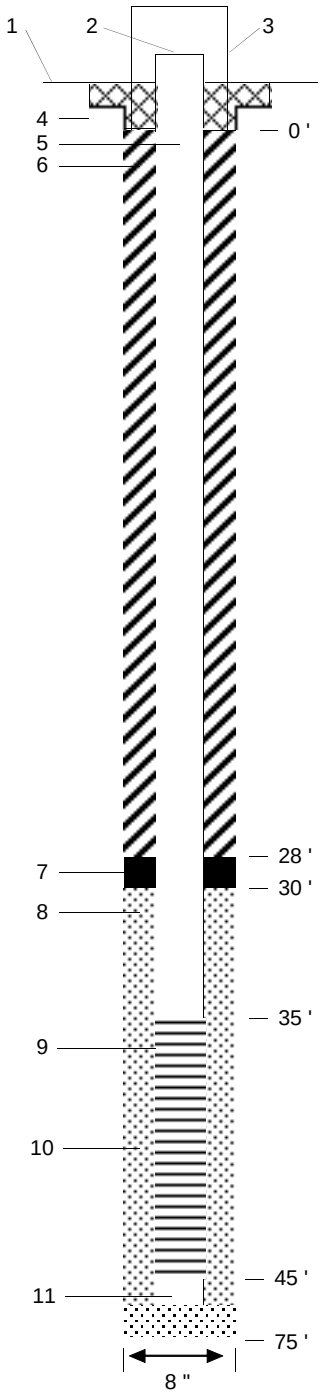
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 156.6 NORTHING: 2183660.998 EASTING: 6722204.339 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: WaterLevels START: 12/02/2004 END: 12/02/2004 LOGGER: E. Haas



1- Ground elevation at well: 156.6 '

2- Top of casing elevation: 157.08 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 1 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout:

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 2 - 50 lb bags

8- Transition sand: #30 Monterey Sand
a) Quantity used: 1 - 100 lb bag

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 10 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments:

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652	BORING ID: 08C034VMP Sheet 1 of 1

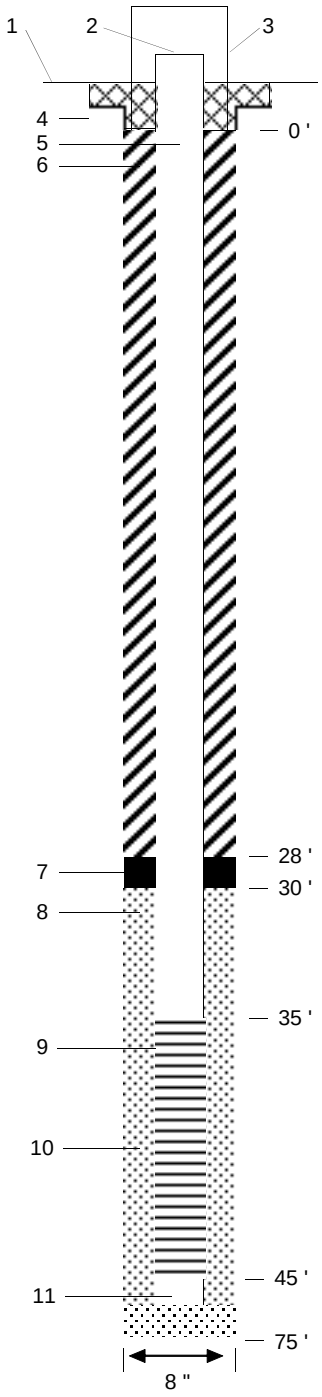
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 158.47 NORTHING: 2183737.369 EASTING: 6722034.761 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: START: 12/01/2004 END: 12/01/2004 LOGGER: E. Haas



1- Ground elevation at well: 158.47 '

2- Top of casing elevation: 159.14 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 1 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout: 5 bags

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 12 - 50 lb bags

8- Transition sand:
a) Quantity used:

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 18 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments:

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652	BORING ID: 08C035VMP Sheet 1 of 1

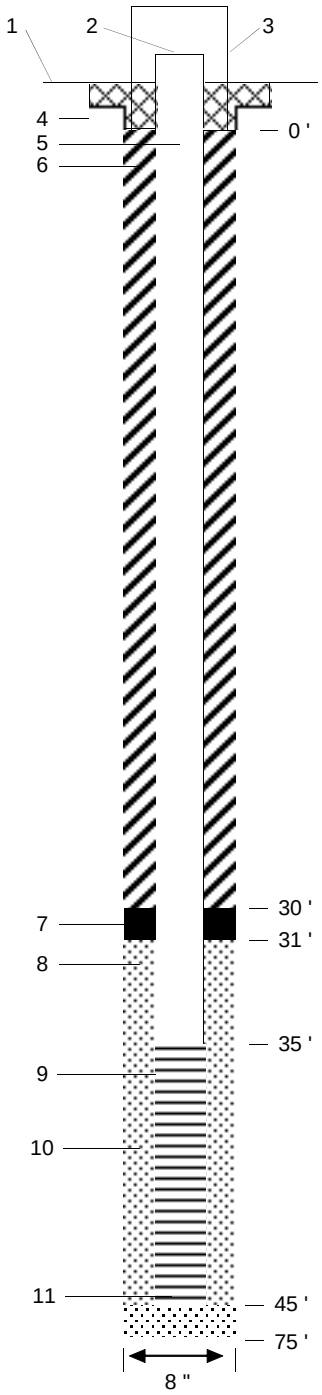
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 157.89 NORTHING: 2183664.866 EASTING: 6722083.906 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 12/06/2004 END: LOGGER: B. Moayyad



1- Ground elevation at well: 157.89 '

2- Top of casing elevation: 158.14 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 1 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Tremie
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout:

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 4 - 50 lb bags

8- Transition sand:
a) Quantity used:

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used:

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments:

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652.05.02.01	BORING ID: 08C036VMP Sheet 1 of 1

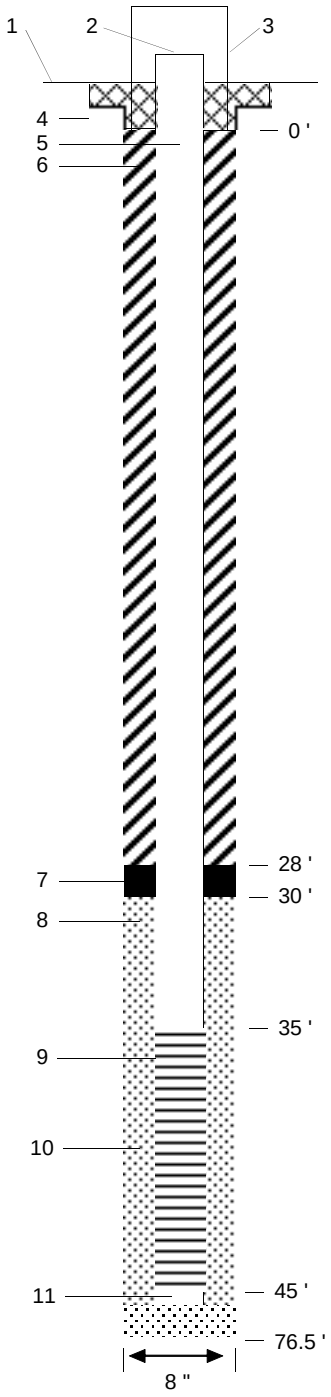
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 159.29 NORTHING: 2183638.23 EASTING: 6722035.654 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: None START: END: 11/02/2004 LOGGER: S. Shearer



1- Ground elevation at well: 159.29 '

2- Top of casing elevation: 159.63 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 1 "
Well casing type: Schedule 80 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout: 5 - 94 lb bags cement, 105 gallons

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 8.5 - 50 lb bags

8- Transition sand: #30 Monterey Sand
a) Quantity used: 1 - 100 lb bag

9-Type/slot size of screen: Schedule 80 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 9 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments: Portland Type I-II-V cement and bentonite gel used for grout.
Transition sand: 63-62' and 31-30' bgs.

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652	BORING ID: 08C037VMP Sheet 1 of 1

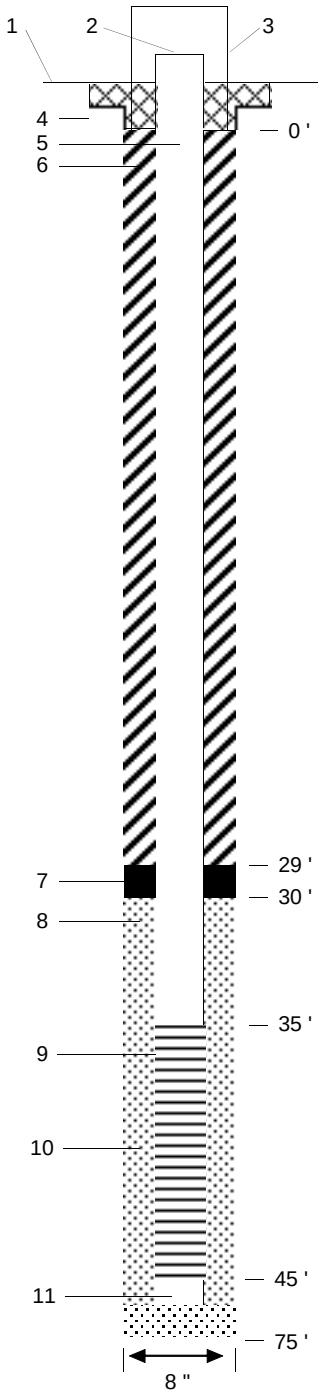
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 158.37 NORTHING: 2183947 EASTING: 6722012.109 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: None START: END: LOGGER: E. McCarthy



1- Ground elevation at well: 158.37 '

2- Top of casing elevation: 158.83 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 1 "
Well casing type: Schedule 80 PVC

6- Grout:
a) Grout mix used: 5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout: ~100 gallons

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 9 - 50 lb bags

8- Transition sand: #30 Monterey Sand
a) Quantity used: 1 - 100 lb bag

9-Type/slot size of screen: Schedule 80 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 16 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments: Portland Type I-II-V cement and bentonite gel used for grout.
Transition sand: 61-60' and 31-30' bgs.

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652.05.02.01	BORING ID: 08C038VMP Sheet 1 of 1

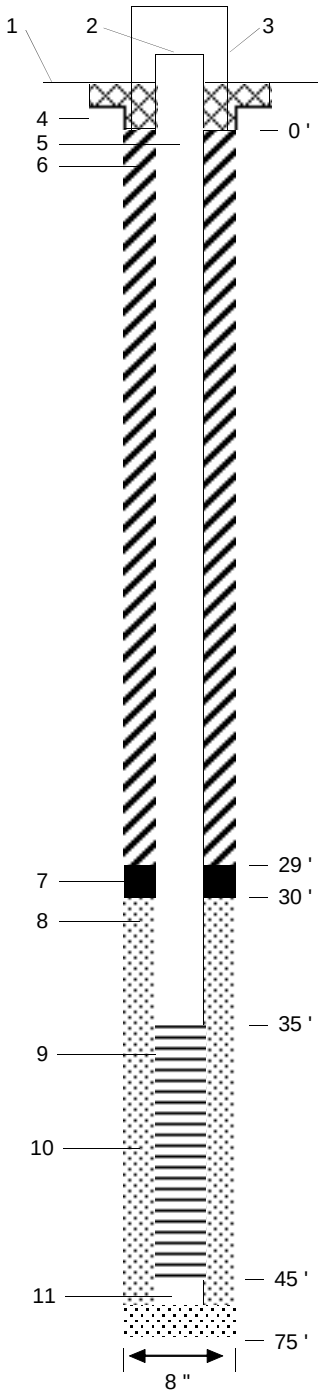
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 159.54 NORTHING: 2183698.269 EASTING: 6721950.124 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: NA START: 11/30/2004 END: 11/30/2004 LOGGER: E. Haas



1- Ground elevation at well: 159.54 '

2- Top of casing elevation: 159.89 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 1 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout:

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 12 - 50 lb bags

8- Transition sand:
a) Quantity used:

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 15 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments:

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652	BORING ID: 08C039VMP Sheet 1 of 1

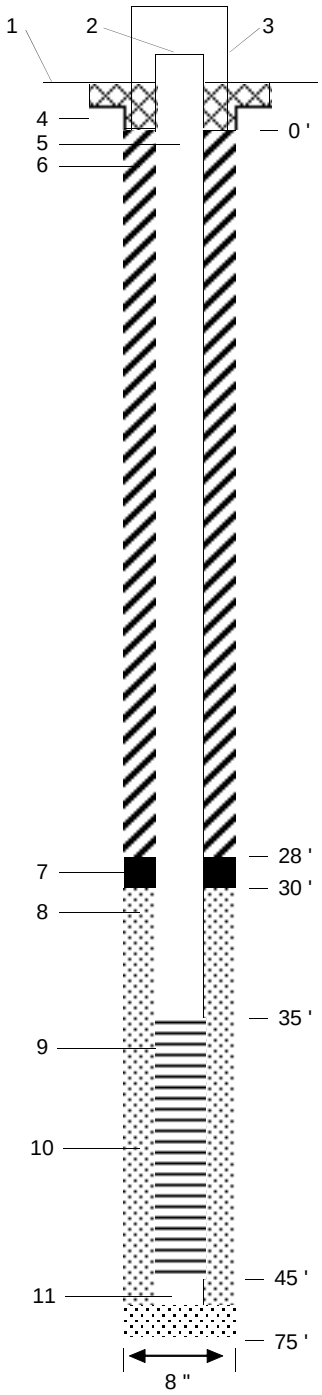
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 159.28 NORTHING: 2183806.93 EASTING: 6721905.808 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: START: 12/03/2004 END: 12/03/2004 LOGGER: E. Haas



1- Ground elevation at well: 159.28 '

2- Top of casing elevation: 159.5 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 1 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout:

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 11 - 50 lb bags

8- Transition sand: #30 Monterey Sand
a) Quantity used: 1 - 100 lb bag

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 7 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments: Transition sand: 61-60' and 31-30' bgs.

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652.05.02.01	BORING ID: 08C040VEWS Sheet 1 of 1

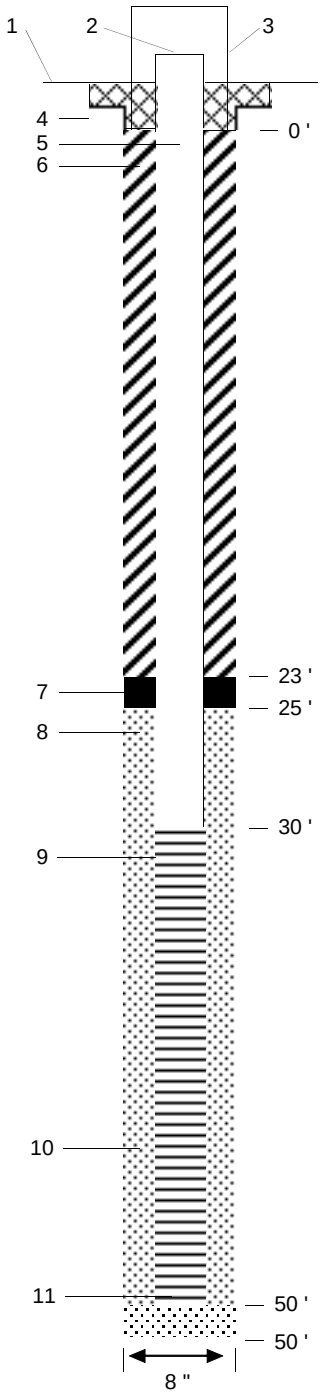
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 157.78 NORTHING: 2183744.192 EASTING: 6722204.484 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: None START: 11/03/2004 END: 11/05/2004 LOGGER: S. Shearer



1- Ground elevation at well: 157.78 '

2- Top of casing elevation: 157.92 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 2 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout: 7 - 94 lb bags cement, 90 gallons

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 1 - 50 lb bag

8- Transition sand: #30 Monterey Sand
a) Quantity used: 0.5 - 100 lb bag

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 7.5 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments: Transition sand: 26-25' bgs.

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652.05.02.01	BORING ID: 08C040VEWD Sheet 1 of 1

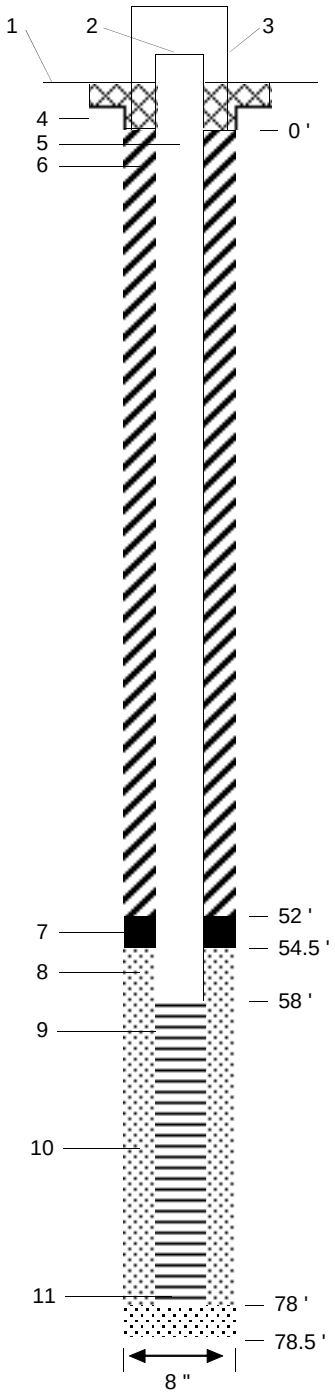
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 157.78 NORTHING: 2183742.284 EASTING: 6722200.692 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: None START: 11/04/2004 END: 11/05/2004 LOGGER: S. Shearer



1- Ground elevation at well: 157.78 '

2- Top of casing elevation: 158.05 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 2 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Tremie
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout: 11 - 94 lb bags cement, 160 gallons

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 1 - 50 lb bag

8- Transition sand: #30 Monterey Sand
a) Quantity used: 0.5 - 100 lb bag

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 8 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments: Transition sand: 56-54.5' bgs.

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652	BORING ID: 08C041VEWS Sheet 1 of 1

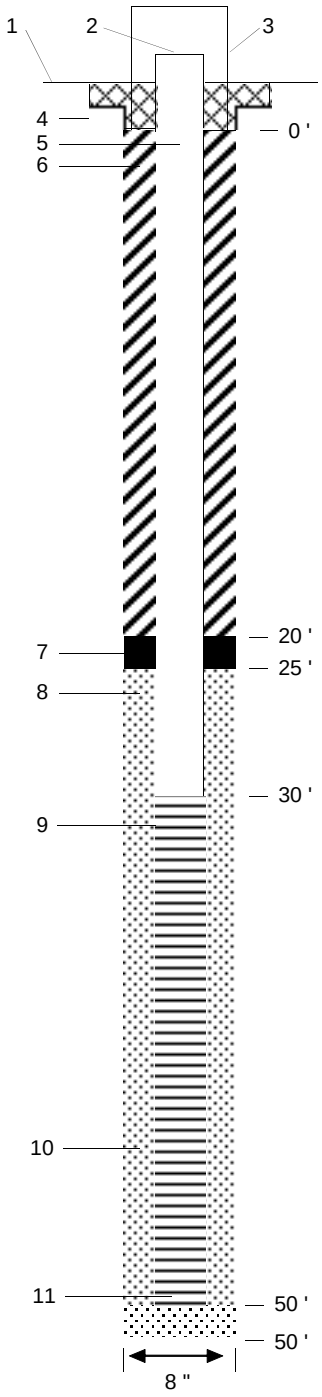
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 158.59 NORTHING: 2183854.311 EASTING: 6722007.224 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: START: 11/11/2004 END: 11/11/2004 LOGGER: E. Haas



1- Ground elevation at well: 158.59 '

2- Top of casing elevation: 159.22 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 2 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout: 7 - 94 lb bags cement

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 1 - 50 lb bag

8- Transition sand: #30 Monterey Sand
a) Quantity used: 0.5 - 100 lb bag

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 10 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): 30' and 50' bgs

Development:
a) Method:
b) Duration:
c) PurgeVolume:

Comments: Transition sand: 25-24' bgs.

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652	BORING ID: 08C041VEWD Sheet 1 of 1

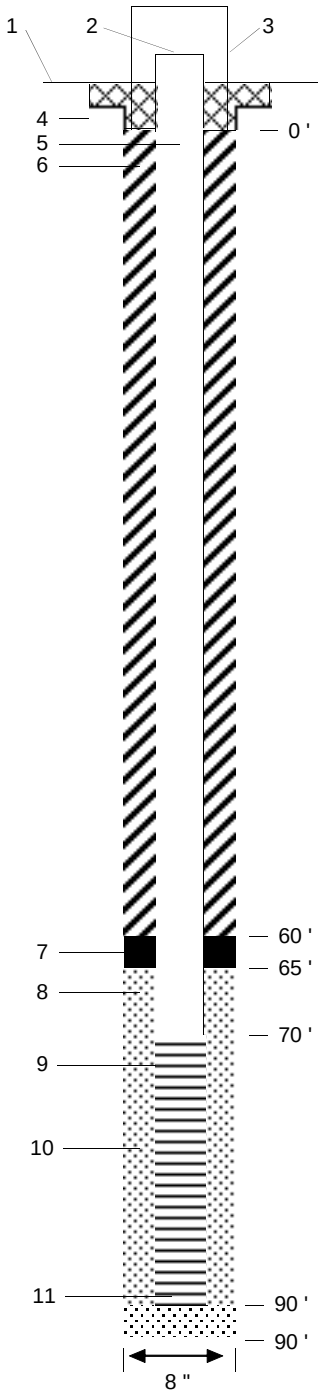
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 158.59 NORTHING: 2183858.44 EASTING: 6722006.523 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: START: 11/11/2004 END: 11/11/2004 LOGGER: E. Haas



1- Ground elevation at well: 158.59 '

2- Top of casing elevation: 159.05 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 2 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Tremie
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout: 10 - 94 lb bags cement

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 1 - 50 lb bag

8- Transition sand: #30 Monterey Sand
a) Quantity used: 1 - 100 lb bag

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 9 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): 90' and 70' bgs

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments: Transition sand: 65-64' bgs.

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652	BORING ID: 08C042VWS Sheet 1 of 1

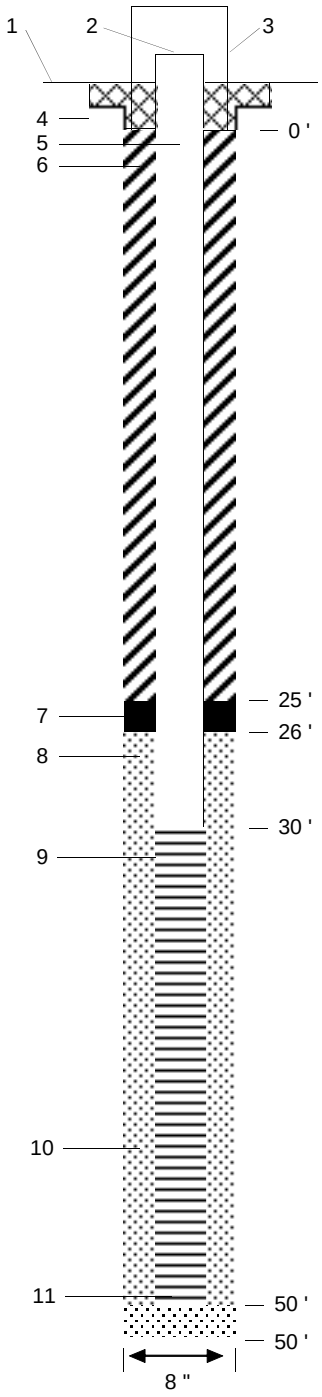
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 158.92 NORTHING: 2183720.42 EASTING: 6721965.452 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: None START: 11/23/2004 END: 11/23/2004 LOGGER: E. McCarthy



1- Ground elevation at well: 158.92 '

2- Top of casing elevation: 159.42 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 2 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout:

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 1 - 50 lb bag

8- Transition sand: #30 Monterey Sand
a) Quantity used: 0.5 - 100 lb bag

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 13 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments: Transition sand: 26-25' bgs.

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652	BORING ID: 08C042VWD Sheet 1 of 1

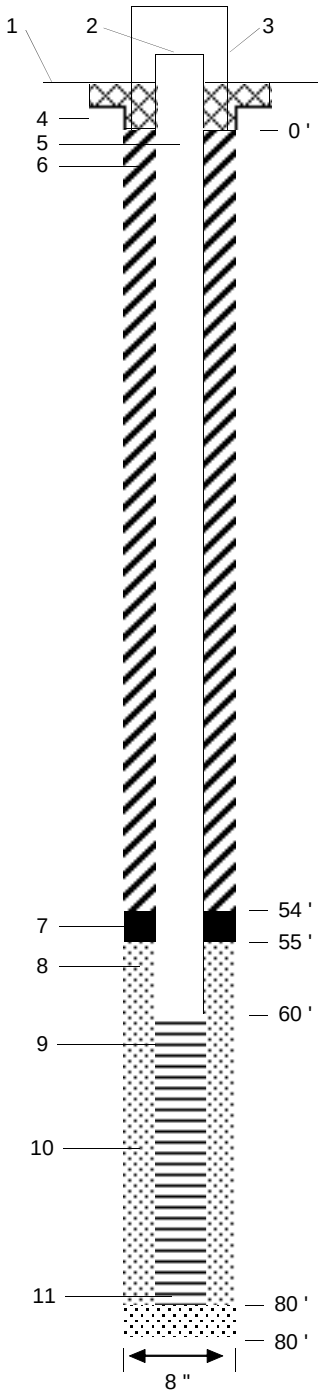
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 158.92 NORTHING: 2183724.26 EASTING: 6721996.591 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: None START: 11/22/2004 END: 11/23/2004 LOGGER: E. McCarthy



1- Ground elevation at well: 158.92 '

2- Top of casing elevation: 158.88 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 2 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout: 18 - 94 lb bags cement

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 1 - 50 lb bag

8- Transition sand: #30 Monterey Sand
a) Quantity used: 0.5 - 100 lb bag

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 13 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments: Transition sand: 56-55' bgs.

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652	BORING ID: 08C043VWS Sheet 1 of 1

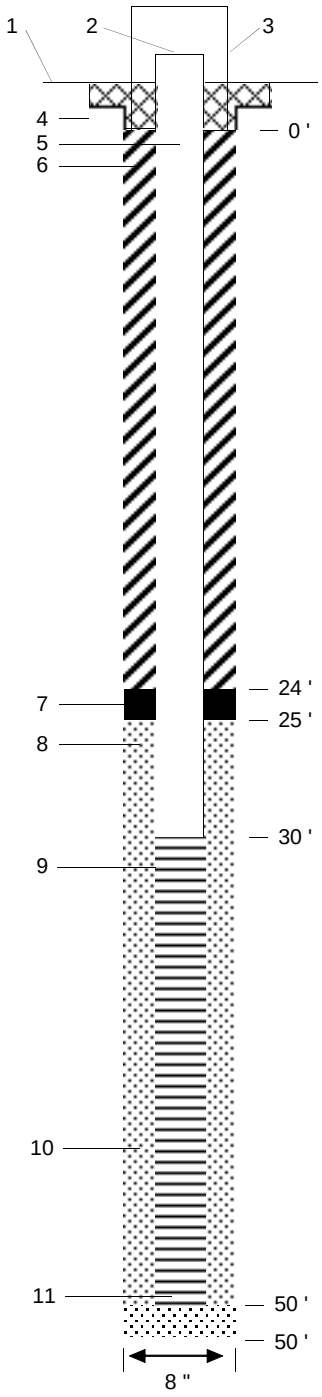
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 160.37 NORTHING: 2183697.044 EASTING: 6722050.196 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: None START: 11/22/2004 END: 11/22/2004 LOGGER: E. McCarthy



1- Ground elevation at well: 160.37 '

2- Top of casing elevation: 160.78 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 2 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout: 11 - 94 lb bags cement

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 1 - 50 lb bag

8- Transition sand: #30 Monterey Sand
a) Quantity used: 0.5 - 100 lb bag

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 9 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments: Transition sand: 26-25' bgs.

NOTE: NOT TO SCALE

CH2MHILL	PROJECT NUMBER: 317652.05.02.01	BORING ID: 08C043VWD Sheet 1 of 1

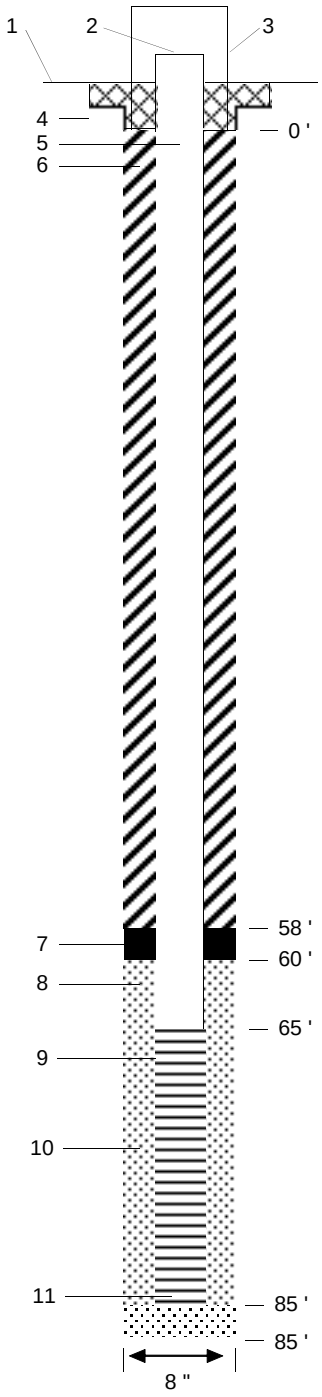
WELL COMPLETION DIAGRAM

PROJECT: Site 8 SVE/Biovent System LOCATION: Beale AFB

GROUND ELEVATION: 160.37 NORTHING: 2183701.475 EASTING: 6722048.772 DRILLING CONTRACTOR: Water Development Corp., Zamora, CA

DRILLING METHOD AND EQUIPMENT USED: Hollow Stem Auger CME 85

WATER LEVELS: None START: 11/18/2004 END: 11/19/2004 LOGGER: E. McCarthy



1- Ground elevation at well: 160.37 '

2- Top of casing elevation: 160.79 '

3- Wellhead protection cover type: Steel-rated 8" Steel box
Concrete pad dimensions: 18" radius

4- Diameter of Surface Casing:
Surface casing type: N/A

5- Diameter of Well Casing: 2 "
Well casing type: Schedule 40 PVC

6- Grout:
a) Grout mix used: 3-5% Bentonite Cement Grout

b) Method of placement: Free Fall
c) Qty. of surface casing grout: NA
d) Qty. of well casing grout: 26 - 94 lb bags cement

7- Type of seal: Pure Gold Medium Bentonite Chips

a) Quantity used 1 - 50 lb bag

8- Transition sand: #30 Monterey Sand
a) Quantity used: 0.5 - 100 lb bag

9-Type/slot size of screen: Schedule 40 PVC
0.02 "

10- Type of filter pack: #3 Monterey Sand

a) Quantity used: 13 - 100 lb bags

11. PVC end cap:

Centralizers:
a) Type: NA
b) Depths (feet, bgs): NA

Development:
a) Method: NA
b) Duration: NA
c) PurgeVolume: NA

Comments: Transition sand: 61-60' bgs.

NOTE: NOT TO SCALE

APPENDIX D

Non-Hazardous Waste Manifest

ALLIED WASTE

GENERATOR WASTE PROFILE SHEET

Requested Disposal Facility: Forward Landfill
an Allied Waste Company

Waste Profile #
AWI Sales Rep:
Date: May 3, 2005

I. Generator Information

Generator Name: Beale Air Force Base			
Generator Site Address: 6601 B. Street CEVR			
City: Beale AFB	County: Yuba	State: CA	Zip: 95903
State ID/Reg No: CA7570024508	State Approval/Waste Code: (if applicable)		SIC Code:
Generator Mailing Address (if different):			
City:	County:	State:	Zip:
Generator Contact Name: Mrs. Barbara Sugar			
Phone Number: 530-634-2644		Fax Number: 530-634-2845	

IIa. Transporter Information

Transporter Name: Delta Environmental		Contact Name: Beverly Sandoval	
Transporter Address: PO Box 1675			
City: Woodland	County: Yolo	State: CA	Zip: 95776
Phone Number: 530-662.2841	Fax Number: 530-662-1375	State Transportation Number: CAD980695605	

IIb. Billing Information

Bill To: CH2M HILL Inc. A/P		Contact Name: Kim Russart	
Billing Address: PO Box 241329			
City: Denver	State: CO	Zip: 80224	Phone Number:

III. Waste Stream Information

Name of Waste: Investigation Derived Waste
Process Generating Waste: Drill Cuttings From Environmental Investigation
Type of Waste ☐ INDUSTRIAL PROCESS WASTE or ☒ POLLUTION CONTROL WASTE
Physical State: ☒ SOLID ☐ SEMI-SOLID ☐ POWDER ☐ LIQUID ☐ OTHER: ____:
Method of Shipment: ☒ BULK ☐ DRUM ☐ BAGGED ☐ OTHER: ____
Estimated Annual Volume: ☒ CUBIC YARDS: 25 ☐ TONS: ____ ☐ GALLONS ____ ☐ OTHER: ____
Frequency: ☒ ONE TIME ☐ DAILY ☐ WEEKLY ☐ MONTHLY ☐ OTHER:
Special Handling Instructions:

IV. Representative Sample Certification

☐ NO SAMPLE TAKEN

Is the representative sample collected to prepare this profile and laboratory analysis, collected in accordance with U.S. EPA 40 CFR 261.20(c) guidelines or equivalent rules?	☒ YES or ☐ NO
Sample Date: Dec 6, 2004 and March 8, 2005	Type of Sample: ☒ COMPOSITE SAMPLE ☐ GRAB SAMPLE
Laboratory: CH2M HILL Applied Sciences	Sample ID Numbers: S8-IDW120604, S8-IDW030805
Sampler's Employer: Kevin Roberts	
Sampler's Name (printed): Kevin Roberts	Signature:

REV 1

ALLIED WASTE

GENERATOR WASTE PROFILE SHEET (continued)

Waste Profile #

V. Physical Characteristics of Waste

Characteristic Components	% by Weight (range)
1. see letter	
2.	
3.	
4.	
5.	

Color	Odor (describe)	Free Liquids	% Solids	pH:	Flash Point	Phenol
lt to dk brown	none	☐ YES or ☒ NO Content ____%			____ ☐F	____ ppm

Attach Laboratory Analytical Report (and/or Material Safety Data Sheet) Including Required Parameters Provided for this Profile

Does this waste or generating process contain regulated concentrations of the following Pesticides and/or Herbicides: Chlordane, Endrin, Heptachlor (and it epoxides), Lindane, Methoxychlor, Toxaphene, 2,4-D, or 2,4,5-TP Silvex as defined in 40 CFR 261.33?	☐ Yes or ☒ No
Does this waste or generating process cause it to exceed OSHA exposure limits from high levels of Hydrogen Sulfide or Hydrogen Cyanide as defined in 40 CFR 261.23?	☐ Yes or ☒ No
Does this waste contain regulated concentrations of Polychlorinated Biphenyls (PCBs) as defined in 40 CFR Part 761?	☐ Yes or ☒ No
Does this waste contain regulated concentrations of listed hazardous wastes defined in 40 CFR 261.31, 261.32, 261.33, including RCRA F-Listed Solvents?	☐ Yes or ☒ No
Does this waste contain regulated concentrations of 2,3,7,8-Tetrachlorodibenzodioxin (2,3,7,8-TCCD), or any other dioxin as defined in 40 CFR 261.31?	☐ Yes or ☒ No
Is this a regulated Toxic Material as defined by Federal and/or State regulations?	☐ Yes or ☒ No
Is this a regulated Radioactive Waste as defined by Federal and/or State regulations?	☐ Yes or ☒ No
Is this a regulated Medical or Infectious Waste as defined by Federal and/or State regulations?	☐ Yes or ☒ No
Is this waste generated at a Federal Superfund Clean Up Site?	☐ Yes or ☒ No

VI. Generator Certification

I hereby certify that to the best of my knowledge and belief, the information contained herein is a true, complete and accurate description of the waste material being offered for disposal and all known or suspected hazards have been disclosed. All Analytical Results/Material Safety Data Sheets submitted are truthful and complete and are representative of the waste. I further certify that by utilizing this profile, neither myself nor any other employee of the company will deliver for disposal or attempt to deliver for disposal any waste which is classified as toxic waste, hazardous waste or infectious waste, or any other waste material this facility is prohibited from accepting by law. I shall immediately give written notice of any change or condition pertaining to the waste not provided herein. Our company hereby agrees to fully indemnify this disposal facility against any damages resulting from this certification being inaccurate or untrue. I further certify that the company has not altered the form or content of this profile sheet as provided by Allied Waste.

Barbara Sugar Haz Waste Program Manager — Authorized Representative Name And Title (Printed)

Beale AFB — Company Name

Barbara C Sugar — Authorized Representative Signature

5-10-05 — Date

VII. Allied Waste Decision

☐ Approved ☐ Rejected

Expiration: ____

Conditions:

Name, Title

Signature

Date

APPENDIX E

Drawings

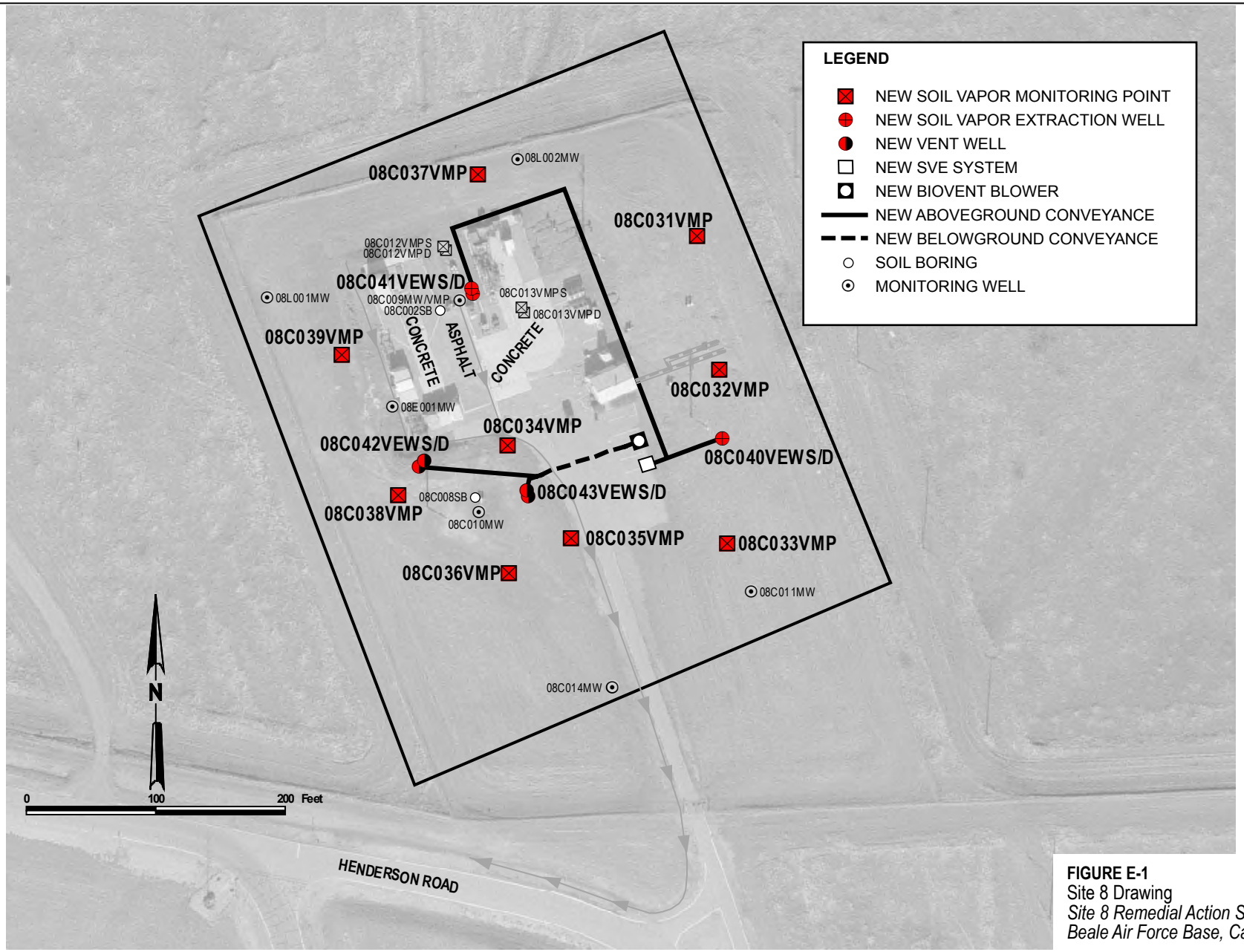


FIGURE E-1
Site 8 Drawing
Site 8 Remedial Action Summary Report
Beale Air Force Base, California

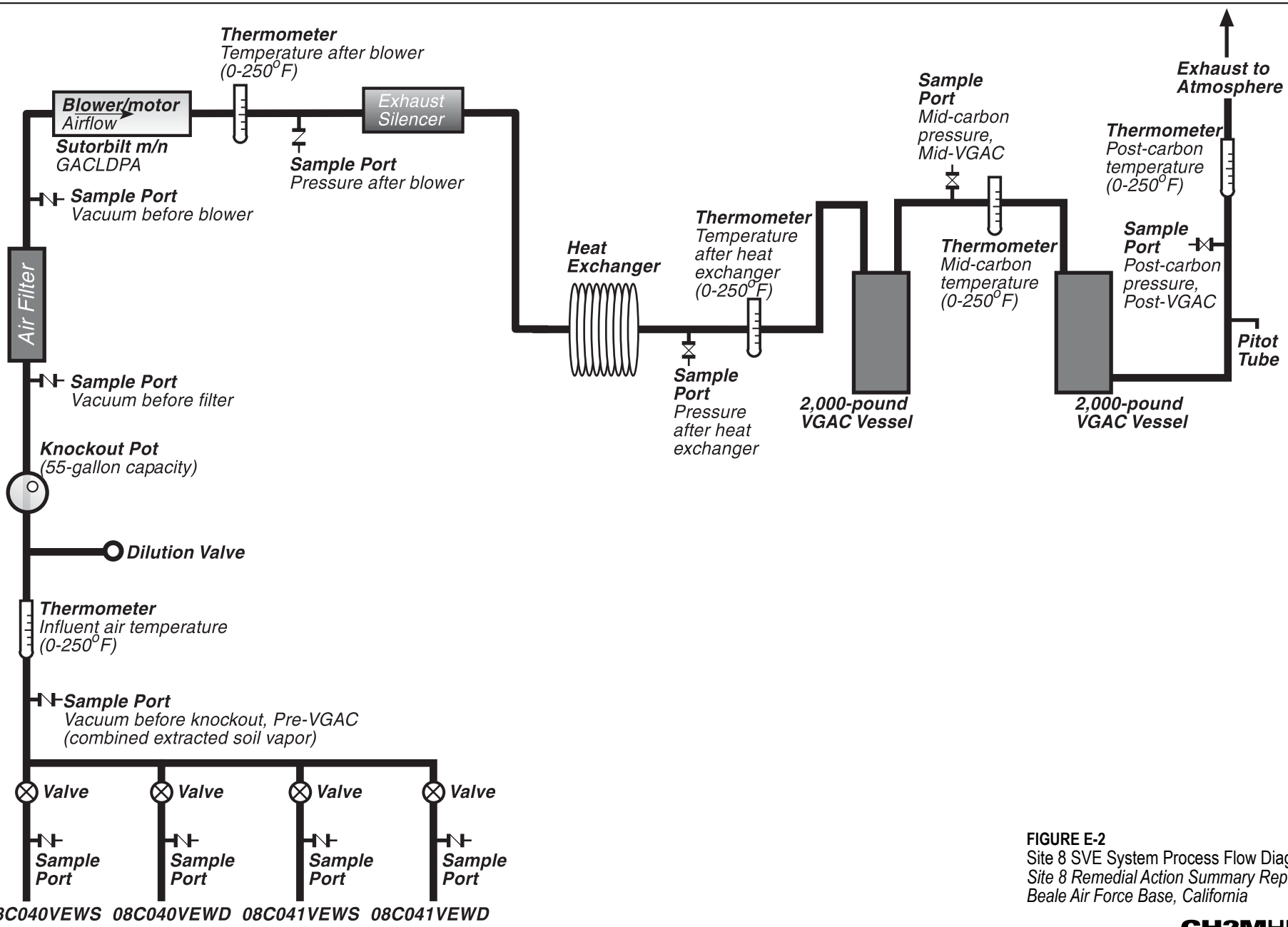


FIGURE E-2
Site 8 SVE System Process Flow Diagram
Site 8 Remedial Action Summary Report
Beale Air Force Base, California

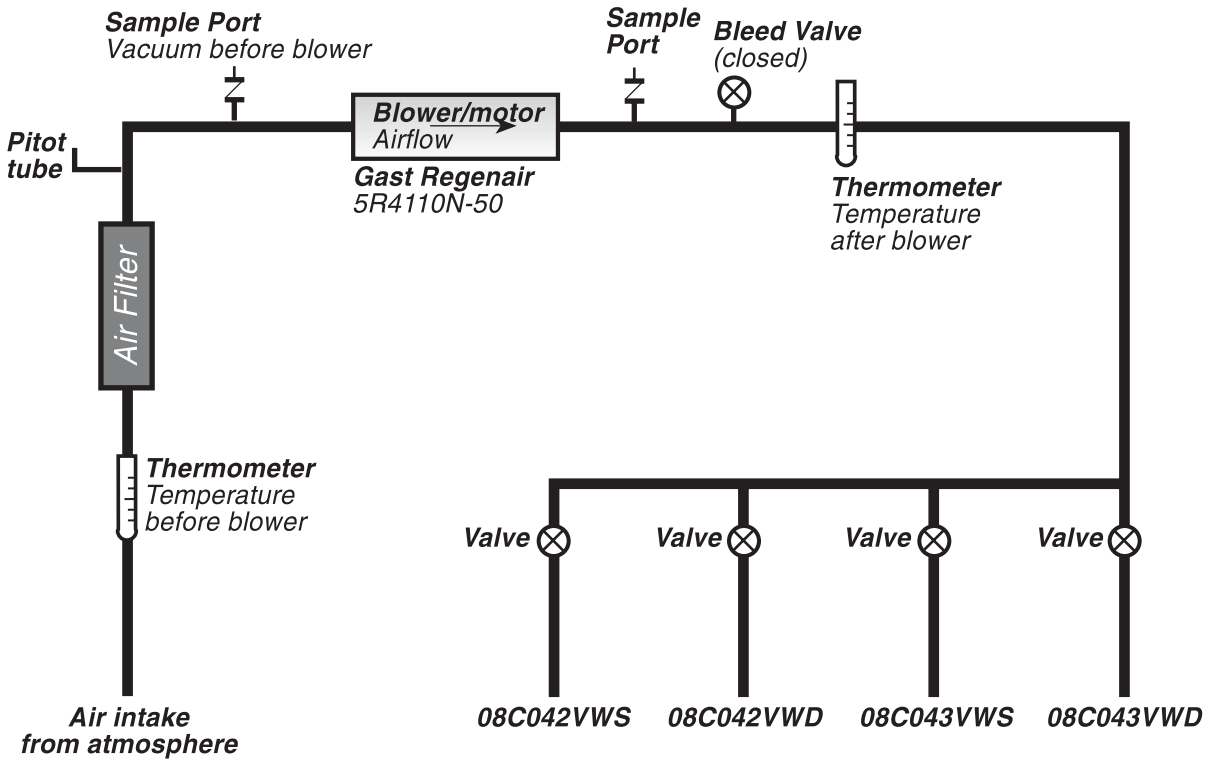


FIGURE E-3
Site 8 Biovent System Process Flow Diagram
Site 8 Remedial Action Summary Report
Beale Air Force Base, California

APPENDIX G

Field Reports

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of November 1 through November 5, 2004 Beale Air Force Base

E-Mail to: Mike O'Brien/9 CES/CEVR, Bob Husk. Contr. 9 CES/CEVR, Vincent Laborde/AFCEE, John Romie/CH2M HILL, Tricia Carter/CH2M HILL, Gerald Vogt/CH2M HILL

From: Jody Sanchez/CH2M HILL Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Ed Haas/RDD	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	Craig Chaffer and Matt Spencer
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 11-8
Drilling and coring at location 08C041VEWD from 0 to 60 feet bgs. Collected soil gas samples at 20 (with an FD) and 40 feet bgs.

Tuesday 11-9
Continued drilling and coring 08C041VEWD from 60 to 70 feet bgs. Collected soil gas sample at 62 feet bgs.

Wednesday 11-10
Continued drilling and coring 08C041VEWD from 70 to 90 feet bgs. Collected soil gas and soil samples at 90 feet bgs.

Thursday 11-11
Construct deep VEW well at location 08C041VEWD with screened interval from 70 to 90 feet bgs. Began drilling and coring at location 08C041VEWS from 0 to 50 feet bgs. Collected soil sample at 40 (with an FD) feet bgs. Construct shallow VEW well at location 08C041VEWS with screened interval from 30 to 50 feet bgs.

Friday 11-12
Began drilling and coring at location 08C037VMP from 0 to 75 feet bgs. Collected soil gas samples at 25, 50, and 75 feet bgs. Collected soil sample at 40 feet bgs.

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	215	8	4	423	14	14

Work Planned for Week of November 15, 2004

- Continue drilling and constructing wells at locations 08C037VMP, 08C031VMP, 08C033VMP and 08C042VW shallow and deep.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of November 8 through November 12, 2004 Beale Air Force Base

E-Mail to: John Romie/CH2M HILL, Gerald Vogt/CH2M HILL, Andy Cramer/CH2M HILL, Theresa Rojas/CH2M HILL, Tricia Carter/CH2M HILL, Kim Tetiva/CH2MHILL

From: Jody Sanchez/CH2M HILL Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Ed Haas/RDD	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	Craig Chaffer and Matt Spencer
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 11-8
Drilling and coring at location 08C041VEWD from 0 to 60 feet bgs. Collected soil gas samples at 20 (with an FD) and 40 feet bgs.

Tuesday 11-9
Continued drilling and coring 08C041VEWD from 60 to 70 feet bgs. Collected soil gas sample at 62 feet bgs.

Wednesday 11-10
Continued drilling and coring 08C041VEWD from 70 to 90 feet bgs. Collected soil gas and soil samples at 90 feet bgs.

Thursday 11-11
Construct deep VEW well at location 08C041VEWD with screened interval from 70 to 90 feet bgs. Began drilling and coring at location 08C041VEWS from 0 to 50 feet bgs. Collected soil sample at 40 (with an FD) feet bgs. Construct shallow VEW well at location 08C041VEWS with screened interval from 30 to 50 feet bgs.

Friday 11-12
Began drilling and coring at location 08C037VMP from 0 to 75 feet bgs. Collected soil gas samples at 25, 50, and 75 feet bgs. Collected soil sample at 40 feet bgs. Soil at 70 feet bgs was gravel therefore the soil sample at was not collected.

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	215	8	4	423	14	14

Work Planned for Week of November 15, 2004

- Continue drilling and constructing wells at locations 08C037VMP, 08C031VMP, 08C033VMP and 08C042VW shallow and deep.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of November 15 through November 19, 2004 Beale Air Force Base

E-Mail to: Mike O'Brien/9 CES/CEVR, Bob Husk. Contr. 9 CES/CEVR, Vincent Laborde/AFCEE, John Romie/CH2M HILL, Tricia Carter/CH2M HILL, Gerald Vogt/CH2M HILL

From: Jody Sanchez/CH2M HILL Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Ed McCarthy/RDD	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	Craig Chaffer and Matt Spencer
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 11-15
Constructed a dual completion, SVE Vapor Monitoring Point at location 08C037VMP with screened interval from 35 to 45 and 65 to 75 feet bgs. Began drilling and coring at location 08C032VMP from 0 to 25 feet bgs. Collected soil gas sample at 25 feet bgs.

Tuesday 11-16
Continued drilling and coring 08C032VMP from 25 to 75 feet bgs. Collected soil gas samples at 50 and 75 feet bgs and soil samples at 40 and 60 (with an FD) feet bgs. Constructed a dual completion, SVE Vapor Monitoring Point at location 08C032VMP with screened interval from 35 to 45 and 65 to 75 feet bgs.

Wednesday 11-17
Began drilling and coring at location 08C031VMP from 0 to 75 feet bgs. Collected soil gas samples at 25, 50, and 75 feet bgs and soil samples at 40 and 70 feet bgs.

Thursday 11-18
Constructed a dual completion, SVE Vapor Monitoring Point at location 08C031VMP with screened interval from 35 to 45 and 65 to 75 feet bgs. Began drilling and coring at location 08C043VWD from 0 to 15 feet bgs. Collected soil sample at 5 (with an MS/SD) and 10 feet bgs.

Friday 11-19
Continued drilling and coring at location 08C043VWD from 15 to 85 feet bgs. Collected soil gas samples at 20, 40 (with an FD), 60, and 80 feet bgs and soil samples at 20, 40, 60, 80, and 85 (only VOCs, high PID readings at 80 caused the boring to go deeper) feet bgs.

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	235	11	14	658	25	28

Work Planned for Week of November 22, 2004

- Continue drilling and constructing wells at locations 08C043VW shallow and deep, 08C042VW shallow and deep, 08C033VMP, and 08C034VMP.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of November 15 through November 19, 2004 Beale Air Force Base

E-Mail to:	John Romie/CH2M HILL	Theresa Rojas/CH2M HILL
	Gerald Vogt/CH2M HILL	Tricia Carter/CH2M HILL
	Andy Cramer/CH2M HILL	Kim Tetiva/CH2MHILL
From:	Jody Sanchez/CH2M HILL	Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Ed McCarthy/RDD	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	Craig Chaffer and Matt Spencer
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 11-15
Constructed a dual completion, SVE Vapor Monitoring Point at location 08C037VMP with screened interval from 35 to 45 and 65 to 75 feet bgs. Began drilling and coring at location 08C032VMP from 0 to 25 feet bgs. Collected soil gas sample at 25 feet bgs. Fork lift was stuck in the mud and had to be towed out.

Tuesday 11-16
Continued drilling and coring 08C032VMP from 25 to 75 feet bgs. Collected soil gas samples at 50 and 75 feet bgs and soil samples at 40 and 60 (with an FD) feet bgs. Constructed a dual completion, SVE Vapor Monitoring Point at location 08C032VMP with screened interval from 35 to 45 and 65 to 75 feet bgs.

Wednesday 11-17
Began drilling and coring at location 08C031VMP from 0 to 75 feet bgs. Collected soil gas samples at 25, 50, and 75 feet bgs and soil samples at 40 and 70 feet bgs.

Thursday 11-18
Constructed a dual completion, SVE Vapor Monitoring Point at location 08C031VMP with screened interval from 35 to 45 and 65 to 75 feet bgs. Began drilling and coring at location 08C043VWD from 0 to 15 feet bgs. Collected soil sample at 5 (with an MS/SD) and 10 feet bgs. Driller's helper was sick and crew had to wait until about 10 am for a helper so that work could start. Crew left early (at 4 pm).

Friday 11-19
Continued drilling and coring at location 08C043VWD from 15 to 85 feet bgs. Collected soil gas samples at 20, 40 (with an FD), 60, and 80 feet bgs and soil samples at 20, 40, 60, 80, and 85 (only VOCs, high PID readings at 80 caused the boring to go deeper) feet bgs.

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	235	11	14	658	25	28

Work Planned for Week of November 22, 2004

- Continue drilling and constructing wells at locations 08C043VW shallow and deep, 08C042VW shallow and deep, 08C033VMP, and 08C034VMP.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of November 22 through November 24, 2004 Beale Air Force Base

E-Mail to: Mike O'Brien/9 CES/CEVR, Bob Husk. Contr. 9 CES/CEVR, Vincent Laborde/AFCEE, John Romie/CH2M HILL, Tricia Carter/CH2M HILL, Gerald Vogt/CH2M HILL

From: Jody Sanchez/CH2M HILL Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Ed McCarthy/RDD	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	Craig Chaffer and Matt Spencer
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 11-22
Constructed the deep vent well at location 08C043VW with a screened interval from 65 to 85 feet bgs. Drilled and constructed the shallow vent well at location 08C043VW with a screened interval from 30 to 50 feet bgs. Began drilling and coring at location 08C042VWD from 0 to 45 feet bgs. Collected soil samples at 5, 10 (with an FD), 20, 40, and soil gas samples at 20 and 40 feet bgs.

Tuesday 11-23
Continued drilling and coring 08C042VWD from 45 to 80 feet bgs. Collected soil gas samples at 60 and 80 feet bgs and soil samples at 60 (with an FD) and 80 feet bgs. An equipment blank was also collected from the split spoon sampler. Constructed the deep vent well at location 08C042VW with a screened interval from 60 to 80 feet bgs. Drilled and began construction of the shallow vent well at location 08C042VW with a screened interval from 30 to 50 feet bgs.

Wednesday 11-24
Due to the holiday no drilling or sampling occurred. Grouted location 08C042VWS. Constructed 11 surface completions.

Thursday 11-25
HOLIDAY

Friday 11-26
HOLIDAY

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	180	4	8	838	29	36

Work Planned for Week of November 29, 2004

- Continue drilling and constructing wells at locations 08C033VMP, 08C034VMP, 08C035VMP, 08C038VMP, and 08C039VMP.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of November 22 through November 24, 2004 Beale Air Force Base

E-Mail to: John Romie/CH2M HILL, Gerald Vogt/CH2M HILL, Andy Cramer/CH2M HILL, Theresa Rojas/CH2M HILL, Tricia Carter/CH2M HILL, Kim Tetiva/CH2MHILL

From: Jody Sanchez/CH2M HILL Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Ed McCarthy/RDD	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	Craig Chaffer and Matt Spencer
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 11-22
Constructed the deep vent well at location 08C043VW with a screened interval from 65 to 85 feet bgs. Drilled and constructed the shallow vent well at location 08C043VW with a screened interval from 30 to 50 feet bgs. Began drilling and coring at location 08C042VWD from 0 to 45 feet bgs. Collected soil samples at 5, 10 (with an FD), 20, 40, and soil gas samples at 20 and 40 feet bgs.

Tuesday 11-23
Continued drilling and coring 08C042VWD from 45 to 80 feet bgs. Collected soil gas samples at 60 and 80 feet bgs and soil samples at 60 (with an FD) and 80 feet bgs. An equipment blank was also collected from the split spoon sampler. Constructed the deep vent well at location 08C042VW with a screened interval from 60 to 80 feet bgs. Drilled and began construction of the shallow vent well at location 08C042VW with a screened interval from 30 to 50 feet bgs.

Wednesday 11-24
Due to the holiday no drilling or sampling occurred. Grouted location 08C042VWS. Constructed 11 surface completions.

Thursday 11-25
HOLIDAY

Friday 11-26
HOLIDAY

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	180	4	8	838	29	36

Work Planned for Week of November 29, 2004

- Continue drilling and constructing wells at locations 08C033VMP, 08C034VMP, 08C035VMP, 08C038VMP, and 08C039VMP.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of November 29 through December 3, 2004 Beale Air Force Base

E-Mail to: Mike O'Brien/9 CES/CEVR, Bob Husk. Contr. 9 CES/CEVR, Vincent Laborde/AFCEE, John Romie/CH2M HILL, Tricia Carter/CH2M HILL, Gerald Vogt/CH2M HILL

From: Jody Sanchez/CH2M HILL Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Ed Haas/SAC	Field Staff
Ben Moayyad/SAC	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	Craig Chaffer and Matt Spencer
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 11-29
Drilled and cored at location 08C038VMP from 0 to 60 feet bgs. Collected soil samples at 5, 10, 20, 40, and soil gas samples at 25 and 50 feet bgs. Continued drilling and coring at location 08C038VMP from 50 to 60 feet

Tuesday 11-30
Continued drilling and coring 08C038VMP from 60 to 75 feet bgs. Collected a soil gas sample at 75 feet bgs and soil samples at 60 and 75 feet bgs. Constructed dual completion vapor monitoring well at location 08C038VMP with a screened interval from 35 to 45 and 65 to 75 feet bgs. Began drilling and coring at location 08C034VMP from 0 to 55 feet bgs. Collected soil gas samples at 25 and 50 feet bgs and soil samples at 5, 10, 20, and 40 feet bgs.

Wednesday 12-1
Continued drilling and coring 08C034VMP from 55 to 75 feet bgs. Collected a soil gas sample at 75 feet bgs and soil samples at 60 and 75 feet bgs. Constructed dual completion vapor monitoring well at location 08C034VMP with a screened interval from 35 to 45 and 65 to 75 feet bgs. Grouted locations 08C034VMP and 08C038VMP.

Thursday 12-2
Drilled and cored at location 08C033VMP from 0 to 75 feet bgs. Collected soil samples at 40 and 70 feet bgs, and soil gas samples at 25, 50, and 75 feet bgs. Constructed dual completion vapor monitoring well at location 08C033VMP with a screened interval from 35 to 45 and 65 to 75 feet bgs. Began drilling and coring at location 08C039VMP from 0 to 20 feet bgs.

Friday 12-3
Drilled and cored at location 08C039VMP from 20 to 75 feet bgs. Collected soil samples at 40 and 70 feet bgs, and soil gas samples at 25, 50, and 75 feet bgs. Constructed dual completion vapor monitoring well at location 08C039VMP with a screened interval from 35 to 45 and 65 to 75 feet bgs. Grouted locations 08C033VMP and 08C039VMP. Began drilling and coring at location 08C035VMP from 0 to 10 feet bgs. Collected soil samples at 5 and 10 feet bgs.

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	310	12	18	1148	41	54

Work Planned for Week of December 6, 2004

- Continue drilling and constructing the well at location 08C035VMP. Finish remaining surface completions and collect IDW sample (analyze for VOCs, TPH-G, TPH-D, and Metals [aluminum and chromium]).

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of November 29 through December 3, 2004 Beale Air Force Base

E-Mail to: John Romie/CH2M HILL, Gerald Vogt/CH2M HILL, Andy Cramer/CH2M HILL, Theresa Rojas/CH2M HILL, Tricia Carter/CH2M HILL, Kim Tetiva/CH2MHILL

From: Jody Sanchez/CH2M HILL Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Ed Haas/SAC	Field Staff
Ben Moayyad/SAC	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	Craig Chaffer and Matt Spencer
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 11-29
Drilled and cored at location 08C038VMP from 0 to 60 feet bgs. Collected soil samples at 5, 10, 20, 40, and soil gas samples at 25 and 50 feet bgs. Head on the rig was damaged and a replacement rig was sent out. Site work was shut down from approximately 10:30 to approximately 14:00. Continued drilling and coring at location 08C038VMP from 50 to 60 feet

Tuesday 11-30
Continued drilling and coring 08C038VMP from 60 to 75 feet bgs. Collected a soil gas sample at 75 feet bgs and soil samples at 60 and 75 feet bgs. Constructed dual completion vapor monitoring well at location 08C038VMP with a screened interval from 35 to 45 and 65 to 75 feet bgs. Began drilling and coring at location 08C034VMP from 0 to 55 feet bgs. Collected soil gas samples at 25 and 50 feet bgs and soil samples at 5, 10, 20, and 40 feet bgs.

Wednesday 12-1
Continued drilling and coring 08C034VMP from 55 to 75 feet bgs. Collected a soil gas sample at 75 feet bgs and soil samples at 60 and 75 feet bgs. Constructed dual completion vapor monitoring well at location 08C034VMP with a screened interval from 35 to 45 and 65 to 75 feet bgs. Grouted locations 08C034VMP and 08C038VMP.

Thursday 12-2
Drilled and cored at location 08C033VMP from 0 to 75 feet bgs. Collected soil samples at 40 and 70 feet bgs, and soil gas samples at 25, 50, and 75 feet bgs. Constructed dual completion vapor monitoring well at location 08C033VMP with a screened interval from 35 to 45 and 65 to 75 feet bgs. Began drilling and coring at location 08C039VMP from 0 to 20 feet bgs.

Friday 12-3
Drilled and cored at location 08C039VMP from 20 to 75 feet bgs. Collected soil samples at 40 and 70 feet bgs, and soil gas samples at 25, 50, and 75 feet bgs. Constructed dual completion vapor monitoring well at location 08C039VMP with a screened interval from 35 to 45 and 65 to 75 feet bgs. Grouted locations 08C033VMP and 08C039VMP. Began drilling and coring at location 08C035VMP from 0 to 10 feet bgs. Collected soil samples at 5 and 10 feet bgs.

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	310	12	18	1148	41	54

Work Planned for Week of December 6, 2004

- Continue drilling and constructing the well at location 08C035VMP. Finish remaining surface completions and collect IDW sample (analyze for VOCs, TPH-G, TPH-D, and Metals [aluminum and chromium]).

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of December 6 through December 10, 2004 Beale Air Force Base

E-Mail to: Mike O'Brien/9 CES/CEVR, Bob Husk. Contr. 9 CES/CEVR, Vincent Laborde/AFCEE, John Romie/CH2M HILL, Tricia Carter/CH2M HILL, Gerald Vogt/CH2M HILL

From: Jody Sanchez/CH2M HILL Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Ed Haas/SAC	Field Staff
Ben Moayyad/SAC	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	Craig Chaffer and Matt Spencer
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 12-6
Continued drilling and coring at location 08C035VMP from 10 to 75 feet bgs. Collected soil samples at 20, 35, 60, and 75 and soil gas samples at 25, 50, and 75 feet bgs. Constructed dual completion vapor monitoring well at location 08C035VMP with a screened interval from 35 to 45 and 65 to 75 feet bgs. Drill crew de-mobbed from Site 8. Waste characterization sample was collected and sent to the lab.

Tuesday 12-7
No work performed at Site 8

Wednesday 12-8
No work performed at Site 8

Thursday 12-9
No work performed at Site 8

Friday 12-10
WDC sent a person out to do well completions at Site 8. Completed 5 flush mount surface completions.

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	65	3	4	1213	44	58

Work Planned for Week of December 13, 2004

- Complete surface completions and begin constructing the SVE and Biovent Systems.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of December 6 through December 10, 2004 Beale Air Force Base

E-Mail to:	John Romie/CH2M HILL	Theresa Rojas/CH2M HILL
	Gerald Vogt/CH2M HILL	Tricia Carter/CH2M HILL
	Andy Cramer/CH2M HILL	Kim Tetiva/CH2MHILL
From:	Jody Sanchez/CH2M HILL	Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Ed Haas/SAC	Field Staff
Ben Moayyad/SAC	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	Craig Chaffer and Matt Spencer
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 12-6
Continued drilling and coring at location 08C035VMP from 10 to 75 feet bgs. Collected soil samples at 20, 35, 60, and 75 and soil gas samples at 25, 50, and 75 feet bgs. Constructed dual completion vapor monitoring well at location 08C035VMP with a screened interval from 35 to 45 and 65 to 75 feet bgs. Drill crew de-mobbed from Site 8. Waste characterization sample was collected and sent to the lab.

Tuesday 12-7
No work performed at Site 8

Wednesday 12-8
No work performed at Site 8

Thursday 12-9
No work performed at Site 8

Friday 12-10
WDC sent a person out to do well completions at Site 8. Completed 5 flush mount surface completions.

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	65	3	4	1213	44	58

Work Planned for Week of December 13, 2004

- Complete surface completions and begin constructing the SVE and Biovent Systems.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of December 20 through December 24, 2004 Beale Air Force Base

E-Mail to: Mike O'Brien/9 CES/CEVR, Bob Husk. Contr. 9 CES/CEVR, Vincent Laborde/AFCEE, John Romie/CH2M HILL, Tricia Carter/CH2M HILL, Gerald Vogt/CH2M HILL

From: Jody Sanchez/CH2M HILL Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Kevin Roberts/SAC	Site Safety Coordinator
John Lueck/RDD	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel

Summary of Work Accomplished at Site 8

Monday 12-20
All the conveyance piping has been installed except the line across the asphalt for the Biovent System. The hook ups to the blowers still need to be completed. The installation of the valve ports to all the VMPs and the valve ports on the extract and vent wells have been completed. TN has transported the SVE system and carbon vessels and placed them on site. Work with WDC to get additional surface grout placed in some of the VMPs.

Tuesday 12-21
No work performed at Site 8, After inspection of the site WDC still has more work to do on the VMP vaults. Work with WDC to finish the job.

Wednesday 12-22
No work performed at Site 8

Thursday 12-23
No work performed at Site 8

Friday 12-24
Holiday. No work performed at Site 8.

Work Planned for Week of December 27, 2004

- Begin trenching and electrical hook ups.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of December 20 through December 24, 2004 Beale Air Force Base

E-Mail to:	John Romie/CH2M HILL	Theresa Rojas/CH2M HILL
	Gerald Vogt/CH2M HILL	Tricia Carter/CH2M HILL
	Andy Cramer/CH2M HILL	Kim Tetiva/CH2MHILL
From:	Jody Sanchez/CH2M HILL	Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Kevin Roberts/SAC	Site Safety Coordinator
John Lueck/RDD	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel

Summary of Work Accomplished at Site 8

Monday 12-20
All the conveyance piping has been installed except the line across the asphalt for the Biovent System. The hook ups to the blowers still need to be completed. The installation of the valve ports to all the VMPs and the valve ports on the extract and vent wells have been completed. TN has transported the SVE system and carbon vessels and placed them on site. Work with WDC to get additional surface grout placed in some of the VMPs.

Tuesday 12-21
No work performed at Site 8, After inspection of the site WDC still has some work to do on the VMP vaults. Work with WDC to finish the job.

Wednesday 12-22
No work performed at Site 8

Thursday 12-23
No work performed at Site 8

Friday 12-24
Holiday. No work performed at Site 8.

Work Planned for Week of December 27, 2004

- Begin trenching and electrical hook ups.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of October 25 through October 29, 2004 Beale Air Force Base

E-Mail to: Mike O'Brien/9 CES/CEVR, Bob Husk. Contr. 9 CES/CEVR, Vincent Laborde/AFCEE, John Romie/CH2M HILL, Tricia Carter/CH2M HILL, Gerald Vogt/CH2M HILL

From: Jody Sanchez/CH2M HILL Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Tricia Carter/SAC	Assistant Project Manager/Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	John Chaves, Benny Bludworth, Shawn Ritchie, Craig Chaffee
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 10-25
Set up paper work, notebooks, field book, and organized sampling containers and labels. Conducted health and safety meeting with the crew and signing of the Basewide and site-specific H&S Plan. Moved rig out to Site 8 and set up on 08C036VMP.

Tuesday 10-26
Began drilling and coring at location 08C036VMP from 0 to 50 feet bgs. Collected soil samples at 5 feet (with an FD), 10 feet, 25 feet, 40 feet bgs, and a soil vapor sample at 25 feet bgs.

Wednesday 10-27
Continued to drill and core at location 08C036VMP from 50 to 75 feet bgs. Core barrel was not used due to difficult drilling conditions. Soil gas and soil samples were not collected due to hard, cobble layer. At approximately 75 feet bgs a bolt sheared off the fly wheel on the head of the rig. The rig had to be shut down and taken back to Woodland for repairs.

Thursday 10-28
Rig is not repaired yet.

Friday 10-29
Re-drilled with air rotary to clear plug out of augers (from 64.5 to 75 feet bgs).

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	75	1	7	75	1	7

Work Planned for Week of November 1, 2004

- Complete VMP at location 08C036VMP. Drill and construct wells at 2 additional locations.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of October 25 through October 29, 2004 Beale Air Force Base

E-Mail to:	John Romie/CH2M HILL	Theresa Rojas/CH2M HILL
	Gerald Vogt/CH2M HILL	Tricia Carter/CH2M HILL
	Andy Cramer/CH2M HILL	Kim Tetiva/CH2MHILL
From:	Jody Sanchez/CH2M HILL	Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Tricia Carter/SAC	Assistant Project Manager/Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	John Chaves, Benny Bludworth, Shawn Ritchie, Craig Chaffee
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 10-25
Set up paper work, notebooks, field book, and organized sampling containers and labels. Conducted health and safety meeting with the crew and signing of the Basewide and site-specific H&S Plan. Moved rig out to Site 8 and set up on 08C036VMP.

Tuesday 10-26
Began drilling and coring at location 08C036VMP from 0 to 50 feet bgs. Collected soil samples at 5 feet (with an FD), 10 feet, 25 feet (with an MS/MSD), 40 feet bgs, and a soil vapor sample at 25 feet bgs.

Wednesday 10-27
Continued to drill and core at location 08C036VMP from 50 to 75 feet bgs. Core barrel was not used due to difficult drilling conditions. Soil gas and soil samples were not collected due to hard, cobble layer. At approximately 75 feet bgs a bolt sheared off the fly wheel on the head of the rig. The rig had to be shut down and taken back to Woodland for repairs.

Thursday 10-28
Rig is not repaired yet.

Friday 10-29
Re-drilled with air rotary to clear plug out of augers (from 64.5 to 75 feet bgs).

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	75	1	7	75	1	7

Work Planned for Week of November 1, 2004

- Complete VMP at location 08C036VMP. Drill and construct wells at 2 additional locations.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of November 1 through November 5, 2004 Beale Air Force Base

E-Mail to: Mike O'Brien/9 CES/CEVR, Bob Husk. Contr. 9 CES/CEVR, Vincent Laborde/AFCEE, John Romie/CH2M HILL, Tricia Carter/CH2M HILL, Gerald Vogt/CH2M HILL

From: Jody Sanchez/CH2M HILL Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Sandra Shearer/RDD	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	Craig Chaffer and Matt Spencer
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 11-1
Continued drilling and coring at location 08C036VMP from 75 to 78 feet bgs. Collected soil sample at 78 feet bgs. After beginning well construction, it was determined that 10 feet of auger had separated and were left downhole (at approximately 20 feet bgs) and that the bit had also separated from the rest of the augers. Once the augers were retrieved, they were pulled from the borehole and were suspended while trying to get them over the well casing. The helper went to move the well casing and the pin that connects the augers fell out, causing 1 flight (5 feet) of augers to fall and hit the driller in the shoulder and land on the helper's wrist. The bit was not retrieved. During retrieval of the augers, the well casing was damaged and had to be replaced. The boring had to be re-drilled to remove the filterpack that had been placed and to reconstruct the collapsed boring.

Tuesday 11-2
Began well construction at location 08C036VMP. Screened intervals are from 35 to 45 and 66 to 76 feet bgs. Incident report and root cause analysis were filled out and submitted to Jeff Hilgaertner for Monday's incident. A stop work order was placed for after well completion due to the incident. Work will resume after a meeting with CCI, INC, and WDC to resolve H&S issues regarding the incident.

Wednesday 11-3
Health and saftey meeting with WDC (Bryan Cook, Craig Chaffer, Don Motsko, Dave Watts) and CH2M HILL (Tricia Carter, Sandi Shearer, John Romie, and Jeff Hilgaertner), regarding Monday's incident. Work resumed after the meeting, and field crew began drilling and coring at location 08C040VEWS from 0 to 45 feet bgs. All soil gas and soil samples designated for the shallow boring will be collected in the deep boring (approximately 5 feet away) to expedite drilling time.

Thursday 11-4
Continued drilling 08C040VEWS from 45 to 50 feet bgs. Began drilling and coring at location 08C040VEWD from 0 to 80 feet bgs. Collected soil gas at 20, 40, 60, and 80 (and a FD) feet bgs and soil samples at 35 and 70 feet bgs.

Friday 11-5
Constructed wells at locations 08C040VEWS and 08C040VEWD with screened intervals from 30 to 50 and 58 to 78 feet bgs, respectively.

Drilling Summary Table						
	Work Completed this week			Totals		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	133	5	3	208	6	10

Work Planned for Week of November 8, 2004

- Continue drilling and constructing soil vapor extraction wells at locations 08C041VEWS and 08C041VEWD, 08C040VEWS and 08C042VEWD, and vapor monitoring point 08C037VMP.

Field Progress Report for Site 8 SVE and Biovent Systems Construction Project (FA8903-04-D-8670/TO0078) Week of November 1 through November 5, 2004 Beale Air Force Base

E-Mail to: John Romie/CH2M HILL, Gerald Vogt/CH2M HILL, Andy Cramer/CH2M HILL, Theresa Rojas/CH2M HILL, Tricia Carter/CH2M HILL, Kim Tetiva/CH2MHILL

From: Jody Sanchez/CH2M HILL Phone Number: (530) 229-3443

CH2M HILL Field Staff	Principal Task
Jody Sanchez/RDD	Field Work Coordinator/Site Safety Coordinator
Sandra Shearer/RDD	Field Staff

Contractor and Subcontractor Summary

Contractor Name	Personnel
WDC Exploration	Craig Chaffer and Matt Spencer
MP Environmental	Varies

Summary of Work Accomplished at Site 8

Monday 11-1
Continued drilling and coring at location 08C036VMP from 75 to 78 feet bgs. Collected soil sample at 78 feet bgs. After beginning well construction, it was determined that 10 feet of auger had separated and were left downhole (at approximately 20 feet bgs) and that the bit had also separated from the rest of the augers. Once the augers were retrieved, they were pulled from the borehole and were suspended while trying to get them over the well casing. The helper went to move the well casing and the pin that connects the augers fell out, causing 1 flight (5 feet) of augers to fall and hit the driller in the shoulder and land on the helper's wrist. The bit was not retrieved. During retrieval of the augers, the well casing was damaged and had to be replaced. The boring had to be re-drilled to remove the filterpack that had been placed and to reconstruct the collapsed boring.

Tuesday 11-2
Began well construction at location 08C036VMP. Screened intervals are from 35 to 45 and 66 to 76 feet bgs. Incident report and root cause analysis were filled out and submitted to Jeff Hilgaertner for Monday's incident. A stop work order was placed for after well completion due to the incident. Work will resume after a meeting with CCI, INC, and WDC to resolve H&S issues regarding the incident.

Wednesday 11-3
Health and saftey meeting with WDC (Bryan Cook, Craig Chaffer, Don Motsko, Dave Watts) and CH2M HILL (Tricia Carter, Sandi Shearer, John Romie, and Jeff Hilgaertner), regarding Monday's incident. Work resumed after the meeting, and field crew began drilling and coring at location 08C040VEWS from 0 to 45 feet bgs. All soil gas and soil samples designated for the shallow boring will be collected in the deep boring (approximately 5 feet away) to expedite drilling time. A sheen was noticed near the forklift.

The sheen was absorbed with bentonite chips and cleaned up. The forklift was parked on plastic to monitor the potential leak.

Thursday 11-4
Continued drilling 08C040VEWS from 45 to 50 feet bgs. Began drilling and coring at location 08C040VEWD from 0 to 80 feet bgs. Collected soil gas at 20, 40, 60, and 80 (and a FD) feet bgs and soil samples at 35 and 70 feet bgs. The fork lift was checked and has a small fuel leak and will be changed out with another fork lift.

Friday 11-5
Constructed wells at locations 08C040VEWS and 08C040VEWD with screened intervals from 30 to 50 and 58 to 78 feet bgs, respectively.

Drilling Summary Table						
	Work Completed this week			**Totals**		
	Footage	Soil Vapor Samples	Soil Samples	Footage	Soil Vapor Samples	Soil Samples
Site 8	133	5	3	208	6	10

Work Planned for Week of November 8, 2004

- Continue drilling and constructing soil vapor extraction wells at locations 08C041VEWS and 08C041VEWD, 08C040VEWS and 08C042VEWD, and vapor monitoring point 08C037VMP.

APPENDIX H

Photo Documentation

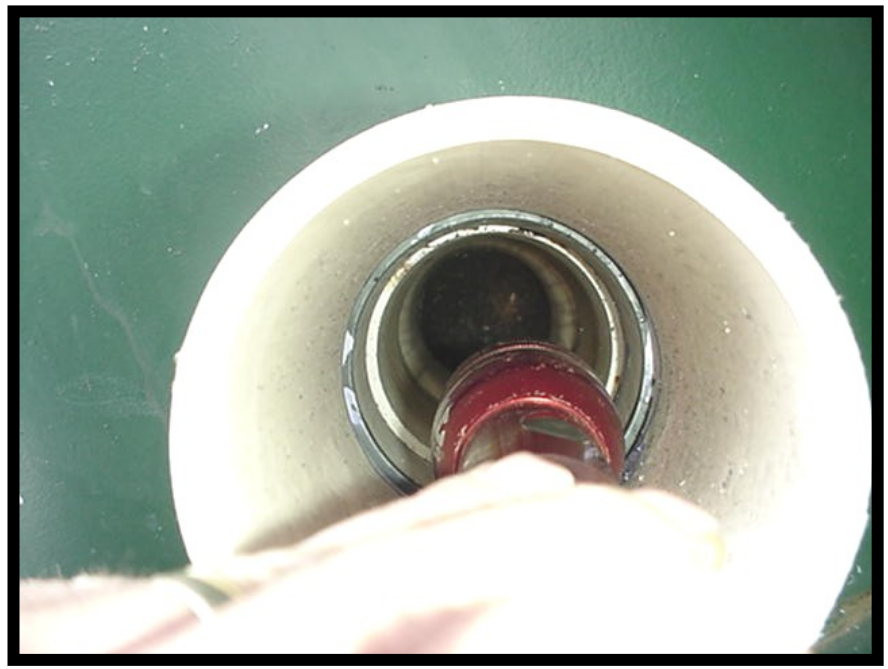
Staging area

Hollow augers

Drilling the wells

Second view of drilling

Completed SVE system



Faulty carbon vessel, later replaced

View of bio-vent (left) and SVE system (right), standing west of the system

Typical bio-vent, SVE well-head completion and conveyance pipeline

Typical vapor monitoring point

Close-up of the bioventing system

SVE system, view from the south

APPENDIX I

Agency Comments

Weir, Diana/SAC

From: Carter, Tricia/SAC
Sent: Wednesday, September 28, 2005 9:27 AM
To: Weir, Diana/SAC
Subject: FW: Site 8 SVE and Biovent System Remedial Action SummaryReport - Your review and comment

FYI again.
Now we are waiting for DTSC and AFCEE.

-----Original Message-----
From: Robert Reeves [mailto:rreeves@waterboards.ca.gov]
Sent: September 27, 2005 4:42 PM
To: Carter, Tricia/SAC
Subject: Re: Site 8 SVE and Biovent System Remedial Action SummaryReport - Your review and comment

Tricia,
I won't have time to review this and send out something official this week and next week is busy with Tier I planning meeting. However, I don't think there any issues with this so I concur with the Report and the interim remedy for Site 8 as indicated verbally in several meetings. So, if you note verbal concurrence I hope that works. -R

›››‹Tricia.Carter@CH2M.com› 09/27/05 1:12 PM ›››
Hello all:
I just wanted to follow up on the review and receipt of comments on this deliverable. Per the August 26th cover letter, comments were requested by September 23rd. I understand that other documents are taking precedence in your review efforts. If you could update me on the status of your review or if you concur with proceeding with the final document, please let me know at your earliest convenience. The urgent matter facing this task order is that the POP expires at the end of this month/week and I would like to complete all work under this TO within this timeframe.

Thanks in advance for your quick response.
Tricia

Weir, Diana/SAC

From: Carter, Tricia/SAC
Sent: Wednesday, September 28, 2005 9:25 AM
To: Weir, Diana/SAC
Subject: FW: Site 8 SVE and Biovent System Remedial Action Summary Report - Your review and comment

FYI

From: O'Brien Michael E Civ 9 CES/CEV [mailto:Michael.O'Brien@beale.af.mil]
Sent: September 28, 2005 7:50 AM
To: Carter, Tricia/SAC
Subject: RE: Site 8 SVE and Biovent System Remedial Action Summary Report - Your review and comment

I have no comments.

MO

From: Tricia.Carter@CH2M.com [mailto:Tricia.Carter@CH2M.com]
Sent: Tuesday, September 27, 2005 12:13 PM
To: STaffinder@teamllc.net; tescarda@dtsc.ca.gov; rreeves@waterboards.ca.gov; O'Brien Michael E Civ 9 CES/CEV
Subject: Site 8 SVE and Biovent System Remedial Action Summary Report - Your review and comment
Importance: High

Hello all:
I just wanted to follow up on the review and receipt of comments on this deliverable. Per the August 26th cover letter, comments were requested by September 23rd. I understand that other documents are taking precedence in your review efforts. If you could update me on the status of your review or if you concur with proceeding with the final document, please let me know at your earliest convenience. The urgent matter facing this task order is that the POP expires at the end of this month/week and I would like to complete all work under this TO within this timeframe.

Thanks in advance for your quick response.
Tricia

Weir, Diana/SAC

From: Carter, Tricia/SAC
Sent: Monday, October 03, 2005 4:24 PM
To: Weir, Diana/SAC
Subject: FW: DTSC Site 8 SVE and Biovent System Remedial Action SummaryReport - Your review and comment

FYI. Here's DTSC's.

-----Original Message-----
From: Terry Escarda [mailto:TEscarda@dtsc.ca.gov]
Sent: October 03, 2005 3:54 PM
To: michael.o'brien@beale.af.mil; Carter, Tricia/SAC; STaffinder@teamllc.net; rreeves@waterboards.ca.gov
Cc: Charlie Ridenour
Subject: Re: Site 8 SVE and Biovent System Remedial Action SummaryReport - Your review and comment

DTSC has reviewed the Draft Site 8 SVE & Biovent System Remedial Action Summary Report, (Draft Report)submitted August 30, 2005. The Draft Report summarized field activities associated with constructing, monitoring, and operating and maintaining an SVE system and a Biovent system at Site 8, the former J-57 Engine Test Cell located at the northern end of the flightline. DTSC concurs with the Draft Report and recommends finalizing it.

The Draft Report noted that 22 wells (nine dual completion VMPs, two dual completion VEWs, and two dual completion vents) were installed, typically at about 45- 30 feet bgs and 75 - 60 bgs, although a hard pan layer at 70 feet required that some sampling and screen interval installation be deeper. Fiftyfour soil core samples (TPH-D, G, and 6 PAH), 54 Encore soil samples (VOCs), and 44 soil vapor samples were obtained. The SVE system was started in early January 2005 and shut down in late January 2005 because of a flow restriction in the lag VGAC vessel. It was restarted in April 2005 and has been operating except for during In-Situ Respiration (ISR) tests for the Biovent System. ISR testing was completed in May 2005.

If you have any questions or concerns regarding this e-mail, please contact me.

Sincerely,

Terry M. Escarda, P.E.
Hazardous Substances Engineer
California Department of Toxic Substances Control N. California Office of Military Facilities
8800 Cal Center Drive Sacramento, CA 95826-3200

Tel: (916) 255-3714 Fax: 255-3734

››› ‹Tricia.Carter@CH2M.com› 9/27/2005 1:12:36 PM ›››
Hello all:
I just wanted to follow up on the review and receipt of comments on this deliverable. Per the August 26th cover letter, comments were requested by September 23rd. I understand that other documents are taking precedence in your review efforts. If you could update me on the status of your review or if you concur with proceeding with the final document, please let me know at your earliest convenience. The urgent matter facing this task order is that the POP expires at the end of this month/week and I would like to complete all work under this TO within this timeframe.

Thanks in advance for your quick response.
Tricia